

THESIS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

DWELLING IN TIME
Studies on life course spatial adaptability

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ABSTRACT

The ongoing demographic transformation entail profound changes in population structures and implies constantly renewed needs and requests for different apartment space configurations. This challenges the field of design and calls for more adequate apartment solutions for a sustainable urban future. However, current design does not meet this challenge. Rather it imposes a conventional attitude as furthermore the housing market, dominated by a commercialized lifestyle focus, appears to ignore the question of long-term resilience. This dictates conditions for residential quality of life, in particular regarding issues of social sustainability, as households often lack the possibility to adapt their homes according to every day needs and long-term life project aspirations. The situation calls for an urgent future realization of a more resilient housing stock.

The thesis addresses the issue of adaptable apartment space and how this can respond to the household's changing spatial needs within an extended life course frame. The aim has been to investigate social dimensions of housing conditions and how adaptability can contribute to enhanced sustainability.

The methodological approach consists of qualitative research using a mix of methods, with empirical studies of living situations combined with research by design in the master studio *MPARC Housing Invention*. The empirical studies consist of enquiries and observations on consecutive dwelling situations effectuated throughout extensive interviews and floor plan registrations. The master studio design work has provided investigations of adaptable apartment design applied in design projects of multi-family residential buildings. The research has been a part of the transdisciplinary knowledge platform *Positive Footprint Housing* initiated by *Riksbyggen EF*, where in parallel the experimental housing project brf Viva has been unfolded, enabling a full-scale research on solutions of adaptable apartments.

The research findings show that adaptable space can provide vital support in family life course processes. It enables people to remain in their neighborhood and to preserve valuable social qualities. It can also increase the possibilities to exercise power over the planning and future transformation of a household's living situation. Spatial adaptability is thus found to be a neglected but most relevant factor for the future design of sustainable apartments.

Keywords: dwelling, spatial adaptability, life course, living process, adaptable apartments, residential resilience, social sustainability.

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This thesis has been conducted between 2011 and 2019 in the division of Building Design, at the department of ACE, Architecture and Civil Engineering, at Chalmers University of Technology, as part of the *Positive Footprint Housing* (PFH) project, a transdisciplinary research platform initiated by Riksbyggen EF, focusing on long-term sustainable solutions for housing design, and the Formas financed Strong Research Environment AIDAH (Architectural Inventions for Dwelling, Ageing and Healthcare) 2014–2019.

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1 INTRODUCTION

The parent reflects the family's dwelling situation during the previous years, how the apartment has supported (or not supported) their spatial needs, and the possibility to adapt the dwelling space to their needs:

Karl, 35: I mean both of these apartments were rental units, so it's a little ... it's not so open to that. Really you have to work it out by how you arrange the furniture. But we experimented quite a bit in our last apartment to make room. We came up with different arrangements, little corners for the kids, a little desk area and things like that. Put the bunk beds in different places.

When discussing the apartments possibility to adapt to changed spatial needs to support the households living situation over time, he is positive, and have a clear idea of what he thinks is the best spatial solution:

First and foremost I think the most important quality in an apartment is for it to be general enough and to accommodate different uses. That's probably more relevant than if it's flexible for being remodeled, just because it's a lot easier [to rearrange the furniture]. Just switch rooms. I think that's a more important attribute.

The discussion above is from one of the empirical studies conducted as part of this thesis in which household members were interviewed in their homes. The resident lives in Additionshuset, a housing development from 1959. He describes his attitude towards adaptable space—the ability to adapt an apartment as the household's situation changes over time. This work studies the qualities that residents regard as critical and the understanding of the home as a spatial container for one part of the course of someone's life as their living needs evolve. It revolves around the subject of adaptable housing and an apartment's ability to respond to present and future spatial demands as a way to enhance the quality of the social dimension in the household.

1.1 BACKGROUND

Dwelling: a volatile, continuous and temporal employment of a certain space that we call home.

My own experiences from years as a practicing architect have brought an increasing interest in housing design and spatial qualities and contributed to the direction of this thesis. Above is my own reflection on the question of the adaptability of the home space, it was formed during the work with this thesis.

The background for this study is formed by the ongoing demographic transformation, the current apartment design, and the conditions in the housing market, and also by my own experiences being a practicing architect. The outcomes from these conditions raise the question of how sustainable the current apartment design is in terms of spatial capacity for a present and future diversity of households.

1.1.1 The demographic transformation

Schneider and Till stress that demographic changes constitute a critical precondition for the design of living space (2007, p. 37), but the difficulty of predicting demographic transformations (Boverket, 2016, p. 8) leaves a broad spectrum of possible demographic outcomes for the future. This suggests that we ought to aim for greater spatial capacity in planning new apartments in order to prepare for a future of unknown needs.

The connection between demography and residential design forms a tradition and an established approach to the planning of housing in Sweden (Dalen & Holm, 1965, pp. 9–21; Gaunt, 1982, pp. 18–34; Eriksson & Lindquist, 1985, pp. 13–22). The established belief is that for the housing stock to remain sustainable in the long term, it needs to build upon a knowledge of future demographic conditions. The Swedish housing authorities in this context describe housing as an important asset and a precondition for people's lives, making housing production a central societal issue, and making the longevity of the housing stock and the geographical immobility of housing a challenge (Boverket, 2016).

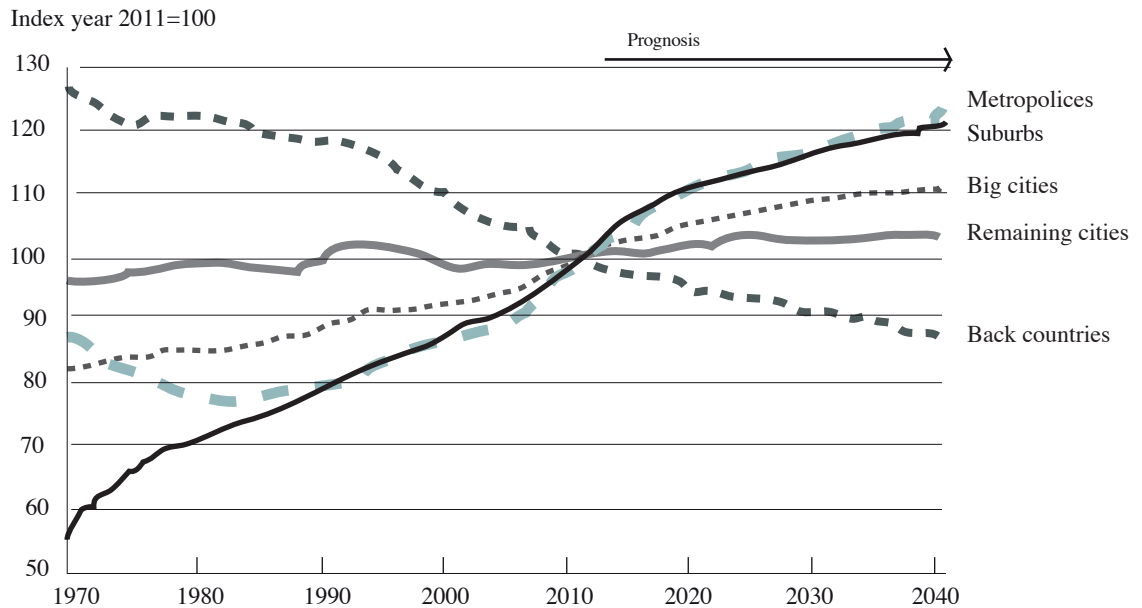


FIGURE 1 Development of population in Sweden 1970–2011 and prognosis until 2040 for different municipality types (Karlsson, 2012).

To address the question of the sustainability of the housing stock, Swedish municipalities today make projections of changing demographics to make it easier to plan the forms of housing that most need to be built (Boverket, 2018), but these projections can be difficult to forecast because they depend on many conditions that change over time (Boverket, 2016, p. 8). Demographic transformation in Sweden continues to lead to urbanization, as it has done for many years (Figure 1)(SCB, 2015). During the last forty years, suburbs have seen the largest increase in population, 70%, while the population of rural areas has declined by 20%. Approximately 70% of the future population growth is expected to take place in metropolitan areas (Karlsson, 2012).

During the coming ten years the population is expected to increase by approximately 1.2 million people, an increase in all age categories (Boverket, 2016). Factors include the aging of the population (SCB 2018c), increasing immigration and an increase in the birth rate associated with it, and an increase in the number of families with three children (SCB, 2017). In 2016,

immigration increased for the fifth year in a row in Sweden due to refugee crises, war, and suppression in other parts of the world, and has now reached the highest level ever measured (SCB, 2017). Increasing immigration can in turn mean larger families and also new lifestyle preferences, such as living in multigenerational households. These situations show some of the ongoing demographic changes and illustrate the difficulties of projecting future demographic conditions.

Schneider and Till emphasize that future demographic conditions need to be assumed to be unknown, as they are too hard to forecast—the only thing that can be predicted is that the changes will mean needs that are different from the ones we see today (Schneider & Till, 2007, pp. 37–38). In this context, they see adaptable housing as a relevant factor for meeting the unknown future demographic conditions. Their approach to adaptable housing appears as relevant when considering the ongoing transformation and what it implies for the spatial capacity of apartments to support new living situations.

The difficulty in projecting demographic transformations means that apartments that offer a broad spatial capacity, that can function for diverse household configurations and accommodate varied layouts within a limited space, better respond to the unpredictable demands on housing in the future. As for today, current apartment design does not fully embrace this focus.

1.1.2 Current apartment design and the housing market

With the present housing shortage, Sweden's National Board of Housing, Building and Planning (Boverket) has estimated a need for approximately 710,000 new housing units over the next ten years (Boverket, 2016, p. 5). This is close to the number of units built during the "Million Program" era of the 1960s and 70s, when the government aimed to create a million new units of housing through industrialized mass production in Sweden (Boverket, 2016, p. 13). Perhaps because of this critical need to build so many new apartments in the near future, there appears to be too little focus on the long-term sustainability of the housing stock.

The current state of practice in apartment design as specified in norms and standards can be seen as both framing and delimiting spatial qualities (Boverket, 2015, pp. 51–66; Swedish Standards Institute, 2006a; Swedish Standards Institute, 2006b). Apartment design involves functionally specific rooms dimensioned around specified furnishings, with each room providing a set functional framework that can accommodate some alternative furnishings (Boverket, 2015, pp. 51–66; Swedish Standards Institute 2006a; Swedish

Standards Institute, 2006b). This means that functional and spatially qualitative apartments can be achieved.

The layout is also based on a preconception of the family life situation, with a parents' bedroom dimensioned to accommodate two twin beds and children's bedrooms each dimensioned for a single twin bed (Boverket, 2015, p. 53). Even though the norms are not expressly based on the ideal of a family with children, that preconceived ideal becomes the model for the size of the rooms, and the configuration of rooms in the apartment reflects it. But although certain qualities are gained by relying on the preconceived design standard, the labeled, functionally dimensioned rooms also exclude some other uses of the spaces and can inhibit residents' ability to arrange their homes as they see fit or to change the room labels, since the living room, bedrooms, and kitchen are all carefully dimensioned for specific uses. The reliance on a preconceived family configuration can also be seen as limiting the apartment's spatial capacity to support diverse household types. In a survey I conducted with a colleague in 2009 (Nylander & Eriksson, 2009, p. 152) room sizes and room organization were both shown to be less functional for households other than families with children. In light of the ongoing demographic transformation that presages a greater diversity of households and demands more diverse spatial qualities, today's apartment designs can be seen as not fully responding to the needs for the future.

The current housing market also appears to be aiming away from a long-term sustainable housing stock. The deregulation of housing from government-driven to market-driven development has meant a shift away from an ambition to provide housing for all to a situation in which economically strong groups set the conditions for housing qualities. One consequence is that housing has become more a question of lifestyle than of the common welfare (Grundström & Molina, 2016; Rodenstedt, 2015). The lifestyle focus appears to be prevalent outside of Sweden as well. Schneider and Till write that housing is seen as a part of a commodified lifestyle in which developers provide residents with equipment elements such as kitchens and bathrooms (2007, p. 37). Duelund Mortensen and Welling describe apartments on the housing market as products designed to be marketed—like automobiles (2004, p. 4). They also emphasize that a small group of wealthy households define the supply of housing because they represent the demand, and the authors further assert that the social aspects are not taken into proper consideration as an effect of this market situation (2004, p. 4). The lifestyle focus means that long-term considerations, such as an apartment's

spatial capacity to accommodate the ongoing demographic transformation and adequately provide for present and future housing needs, become less prominent and might be sidestepped in the discussion of apartment design qualities. The lifestyle focus targeting high-income households also leaves out a large portion of the households in Sweden. This in turn means that households that lack the means to own their own homes are relegated to the remaining stock of rental housing. For tenants in the rental market, today's housing shortage can make it difficult to find somewhere to live, thus limiting their choice of neighborhood, size of apartment, configuration of rooms, and quality of construction.

Another consequence of market-driven housing development is the market's response to the housing shortage and the high cost of construction by reducing apartment sizes. At present the statistical data give no clear indication of decreasing apartment sizes (SCB, 2018-a), but the trend of building smaller and more efficient apartments is a common topic of discussion in the industry today, and accessibility requirements for the disabled are even being questioned (Sveriges Byggindustrier, 2018a; Sveriges Byggindustrier, 2018b; Sjöström, 2016). Decreased apartment sizes can mean lower construction costs, which in turn means better affordability for residents. The intention may be good, but in addressing a short-term market condition this approach may be undermining the long-term spatial functionality of the housing stock. For example, accessibility for the disabled should be recognized as a huge quality and be treated carefully, since it embodies the idea of inclusive design for all households. The need to limit the space allotted for the design of apartment floor plans limits the design's ability to serve diverse home configurations and leads toward homogenization in design, producing similar apartments made up of norm-prescribed, functionally-dimensioned rooms. A review of research into recent apartment design and room sizes (based on housing from 2005 and forward) suggests that apartment utility and function have reached a new low, for example in the lack of flexibility in the arrangement of furniture in living rooms, hallways, and small bedrooms (7–8 m²) (Werner, 2008, p. 62). And residents express a desire to reconfigure the layout because they regard the rooms as spatially insufficient (Werner, 2008, p. 62). Size reduction is also a focus of concern in a report from the Royal Institute of British Architects that identifies and discusses the trend towards smaller apartment sizes in new housing in Great Britain (Roberts-Hughes, 2011). The report notes that the limited dimensions of new apartments prevent residents from rearranging their furniture and try-

ing different layouts, provide inadequate storage, and insufficient space for socializing, receiving guests, or spending time in private (Roberts-Hughes, 2011, p. 9). They also conclude that in extreme cases this lack of space for the household has been shown to have significant impacts on health, educational attainment, and family relationships (Roberts-Hughes, 2011, p. 4). The report signals some of the risks of small apartments.

A recent research study on climate effects and apartment renovations also emphasize that a household's ability to adapt their apartment layout appears to contribute to the satisfaction of the dwelling situation (Femenias, Holmström, Jonsdotter, & Thuvander, 2016). The empirical study examines owner-occupied apartments from the 2000s and shows that residents renovate their homes to a larger extent than expected. The spatial interventions address what residents perceive as the qualitative shortcomings of the apartment, as well as changing the layout and the number of rooms in the apartment (Femenias et al., 2016, p. 4). For many residents, changing and adapting the apartment was part of the plan when they bought it. This suggests that many households are not content with the original design of their apartments, but it may also be a result of a current trend that is making home renovation more common.

In conclusion, given the extensive need to produce new housing, neither current apartment designs nor the housing market appears to be responding adequately to the ongoing demographic transformation and the need to provide a sustainable housing stock for the future. Apartment design today does not appear to fully recognize emerging and diversified household constellations and the need for spatial diversity when considering both current household demographics and the unknown demographics of the future. Furthermore, today's market-driven apartment designs, which focus on lifestyle questions and rational solutions, risk overlooking more qualitative design solutions.

1.1.3 *Personal experiences*

My own practice as an architect also constitutes a condition for this thesis. I worked as an architect for fourteen years. That work included a variety of building types but focused on housing, and has provided insight into major factors that influence current housing design practice. In my view, some of these factors result in diminishing possibilities for developing a qualitative design. For example, I have seen that the market's aim to cut costs by building smaller apartments, when paired with Sweden's demanding housing standards and regulations, has had a huge impact on the diversity

of floor plan designs. The standards do deliver the requested qualities, but combining them with reductions in size can produce unexpected outcomes. The strict focus on one specific function for each room also means that other aspects of spatial utility are seldom addressed. The set room functions are based on a preconceived, standardized use of the home, where room sizes and room configurations most often are regarded as fixed entities—a large master bedroom, a smaller children’s bedroom, and a living room. Together with the economic forces that call for cutting costs and minimizing the size of the dwelling, designing anything other than the types and sizes framed in the housing standards becomes difficult.

During 2008 and 2010 I performed two surveys of apartment design practice together with my colleague Ola Nylander, professor at Chalmers University of Technology (Nylander & Eriksson, 2009; Nylander & Braide Eriksson, 2011). These surveys sparked my interest in the connections between dwelling space, living conditions, and household types. One of these apartments in many ways provided the point of departure for this thesis. The household had chosen a rare living arrangement: by using their space in a flexible way, they could achieve their preferred way of living. The case initiated a series of interesting questions concerning the relevance of the apartment’s utility and adaptability and the correlations with social aspects. This eventually provided the direction for this thesis.

1.1.4 The positive footprint housing project

This thesis is part of the research platform Positive Footprint Housing (PFH), which focuses on developing long-term sustainable solutions for housing design. The PFH project will enable some theories from this thesis to be tested in a full-scale environment through the construction of the Viva condominium apartment buildings. The design process and implementation of research for the Viva development largely coincided with this research, and the results are presented in the licentiate thesis (Braide Eriksson, 2016). My involvement in the PFH project has provided an opportunity for me to further explore and develop my questions about the design qualities of the home, and an opportunity to apply the theories in practice. I see this exchange between research and practice as an important process for the field of architecture.

The PFH project started in 2012 and is a collaboration between academia and industry. Riksbyggen EF,¹ a large developer of housing, is the main stakeholder in the project. The others are Johanneberg Science Park,

1 EF means economic union and makes a cooperative corporate form.

Chalmers University of Technology, and the University of Gothenburg. The intention behind the project is to generate usable knowledge of sustainable housing design at the leading edge of innovation internationally, supporting a joint transdisciplinary knowledge development effort between academia and industry. The realization of the Viva condominium development constitutes a full-scale laboratory for implementing sustainable housing ideas developed during the research.

The mission for this thesis as part of the PFH project has been to develop questions related to apartment adaptability and aspects of social sustainability. This work has been performed through research by design in master of architecture studios, where the studio design work has constituted a hub for the research questions. The studio work generated designs that were relevant to questions of social sustainability. These design qualities have been discussed in the PFH research group and have also been implemented in the design work with the Viva housing block. Results from the studio work have been assembled into two reports (Braide Eriksson, 2012; Braide Eriksson, 2013). The implementation of the studio results in the Viva development has enabled the discussion of apartment design and aspects of social sustainability and the validity these issues can have in a real housing development (Braide Eriksson, 2016, pp. 71–78). This has allowed me to reflect on how the ideas that have emerged from work on this thesis might be implemented in practice.

This thesis has been developed as part of the comprehensive PFH research project, but also as a freestanding study, which has made it possible both to frame my research questions within the larger project and to delve deeper into how apartment design relates to aspects of social sustainability and the spatial capacity of adaptable apartment designs.

1.2 AIM AND RESEARCH QUESTIONS

In the background of this thesis is the belief that the apartments we plan need to provide a broad spatial capacity for emerging and diversified household constellations. This is necessary for the household to attain social dimension qualities in its everyday use of the apartment, but also to achieve the goal of providing apartments that can function well for diverse household types and accommodate the demand for a variety of apartment layouts to ensure a sustainable housing stock for the future. The current housing shortage and the need to build many new units in the near future makes this issue urgent.

The objectives for this work are therefore to emphasize the capacity and adaptability of apartment layouts as a critical aspect for design practice and to introduce possible entries into this subject for stakeholders in the housing development field. The focus is on the ability of an apartment's floor plan design to provide adaptable solutions for changing household conditions.

The work is aimed at people who work with planning, construction, and design in the housing sector, and more specifically at developers and architects.

This thesis concentrates on the use of space in the apartment and how this relate to social dimensions in the dwelling situation, with focus on the period of time during which the household expands and contracts—the family life period. The main research question is framed against the background of the ongoing demographic transformation and the lack of focus on apartment layouts that offer a broad spatial utility for the household constellations, and what this implies for social qualities: *How does spatial adaptability relate to social dimensions in dwelling situations?*

This question is followed by six research questions. The first research focus is on the capacity of adaptable apartment design and the relevance this can have. The issue of adaptable apartment capacity will be understood from the perspective of today's apartment design and its spatial capacity. The following questions are asked: *How can adaptable apartments support a household's need for living space over a longer time span? How does this relate to the current apartment design?* These questions consider in particular the living process (expanding and contracting) as an essential and crucial factor for understanding households' appropriation of adaptable space.

The research also explores apartment floor planning in order to contribute to the practice of design. This calls for an understanding of the viability of diverse adaptable design schemes and calls for a second research focus on the following questions: *How do households conceive of adaptable apartment space?* and *What living situations are solved?* The focus on the living process and how it correlates to the work of designing apartment floor plans also emphasizes the question of the spatial characteristics of apartment adaptability, which leads to the question, *How can adaptability be understood spatially?*

The collaboration with the PFH project (presented above, 1.1.4) has also forwarded the question of sustainability. The PFH project focuses on both environmental, economic and social dimensions, for this collaboration though it was seen as critical to gain more knowledge on social sustainability

dimensions in dwelling situations. The research thus explores the prospects for involving social aspects as a quality in the design work with floor plans, posing the question: *How can social sustainability aspects become a salient component in the work with residential floor plan design?*

1.3 CONCEPTS AND NOTIONS APPLIED

The concepts and the notions applied in this thesis needs to be framed and verified.

1.3.1 *Framing the concept of adaptability*

This thesis can be seen as part of the knowledge field of adaptable housing, which has had a strong relationship with the field of architecture since the 1920s and is constantly developing through research and realized building projects.

Adaptable housing can be seen to have developed in two ways: as the result of vernacular traditions and needs and as the result of housing designers' and developers' work with alternative design schemes (Schneider & Till, 2007, p. 13). Example of the vernacular might include the Japanese house (Eldonk & Fassbinder, 1990, p. 11), nomadic tent structures, and Sweden's traditional homesteads, farmhouses, and cottages. Here I will concentrate on the issue of adaptable housing as part of modernist design and as part of a designer's work with adaptable apartment design schemes. The adaptable apartment can offer residents a variety of ways to participate in adapting the home. Schneider and Till describe three ways of making user participation possible (2007, pp. 46–47). The first is to let the resident customize the apartment before the completion of construction, providing a degree of choice over the future home. The second is the ability to adapt a design prior to occupation. This can mean engaging future tenants in determining the spatial capacity of the units and can also impact the mix of unit types. The third way is post-completion user participation. This thesis focuses on adaptability post-completion, when residents can make adjustments on their own terms after the building is already finished.

The concept of *adaptability* is in this thesis related to Schneider and Till's (2007) approach to the subject of flexible housing. They consider the apartment's capacity to deal with volatility as crucial to residential design work and assert that:

Housing has to be flexible enough to deal with two conditions. The first is the need to adapt to the changing needs for individuals as they grow old or less physically able. The second is housing that can respond to the changing constitution of a family as it grows and then contracts (p. 41).

The concept of an *adaptable apartment* in this thesis thus refers to apartments that can adapt to changing spatial needs over different periods of the residents' lives. The concept *adaptable housing* will thus be used instead of *flexible housing*.

The concept of adaptability is understood in this thesis in light of the common condition of expanding and contracting household size. This thesis examines the sequence of periods in life during which there are children living in the home, growing up, and eventually moving out in order to study the process of expanding and contracting. This time span is referred to as the *family life course*. The ability of the apartment to expand and contract in tact with household size is seen as a quality that can serve many different household types, of which the family with children is but one. Three concepts describe adaptability in the thesis, and these are described below in 1.3.2.

1.3.2 *Three concepts of adaptability*

The design of adaptable apartments is understood in this thesis through the three concepts of *generality*, *flexibility*, and *elasticity*. The concepts refer to three strategies for the design of adaptability and contribute to different qualities. These concepts have also been used in other research, and in debate, on the question of adaptability (Wiktorin, 1975, pp. 7–8; Gåsste & Tranaeus, 1970a, p. 67; Manum, 2006, pp. 45–46).

1.3.2.1 Generality

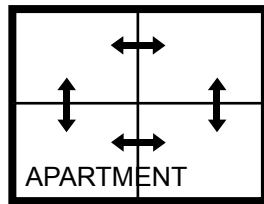


FIGURE 2 The rooms in the generality strategy entail no particular function and are thereby interchangeable (my interpretation).

A *general* layout means that the apartment's rooms are not assigned a particular function but allow a variety of uses without the need to adapt space physically. This means that the rooms to a large extent are interchangeable (Figure 2). Generality can also be described as an apartment with rooms that are physically fixed but a layout that is socially adaptable. Manum describes it as “the capacity of a fixed situation to serve a variety of demands or wishes” (2006, p. 45). Sweden's stately old apartments for the upper-middle class are an example of this type of design.

A room described as having a general layout is often a square space, as this is considered as providing a wider variety of uses. There is no agreed optimal size for such a room. Nylander (2007) relates several useful dimensions, such as the room size of 4x4 meters commonly found in the vernacular cottage in Sweden, and the 3.6 meter dimension recommended for a living room of modern Swedish standard by SBN 1985 (Nylander, 2007, pp. 86–88)² Here he also relates that a study by Bostadsstyrelsen in 1988 shows that the square room is superior to the rectangular room in terms of providing space for a variety of uses.

² SBN, Svensk byggnorm was the earlier name on the Swedish norms and standards.

1.3.2.2 Flexibility

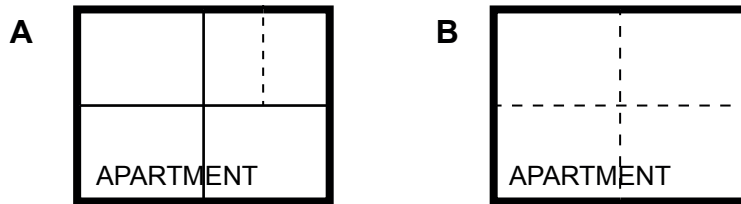


FIGURE 3 A. One or two rooms can be altered in the apartment. B. The design is open space where the main part of the rooms can be demounted (often kitchen and bathroom are fixed in these solutions). The dashed line means optional wall position (my interpretation).

A *flexible* layout refers to an apartment that can be adapted with physical changes through movable or demountable walls or furnishings such as cabinets. Flexibility makes it possible to change the room configuration, the number of rooms, and the room sizes within the footprint of the existing apartment (Figure 3).

The flexible design scheme is often presented as an open space the residents can transform to create a preferred layout with the help of movable wall panels or constructed partitions. One early example is the flexible housing in Weissenhofsiedlung, Germany from 1927 by Ludwig Mies van der Rohe (Schneider & Till, 2007, p. 60). Another example is the Kristalbouw from 1952 in the Netherlands by Jan Trapman (Schneider & Till, 2007, p. 69), also described as a precedent for Habraken's approach with Supports (1972). The Orminge project from 1964–71 (2.2.3) (Nilsson & Åhlund, 1974) is a Swedish example of this type of adaptable solution, as is the Experimenthuset project studied for this thesis (2.2.1) (Andersson, Jonasson, & Olsson, 1988). A recent example is Tila Housing in Helsinki from 2011 by Talli Oy Architecture.

Another example of layout flexibility is a design in which only one or two rooms can be altered, while the rest of the floor plan forms a fixed structure. This type of scheme is presented in the last edition of *God bostad, exempel på lägenheter*, a 1976 collection of best practices from the Swedish Housing Authority (Bostadsstyrelsen). The book presents an extensive review of apartment layouts featuring adaptable schemes in model floor plans.

1.3.2.3 Elasticity

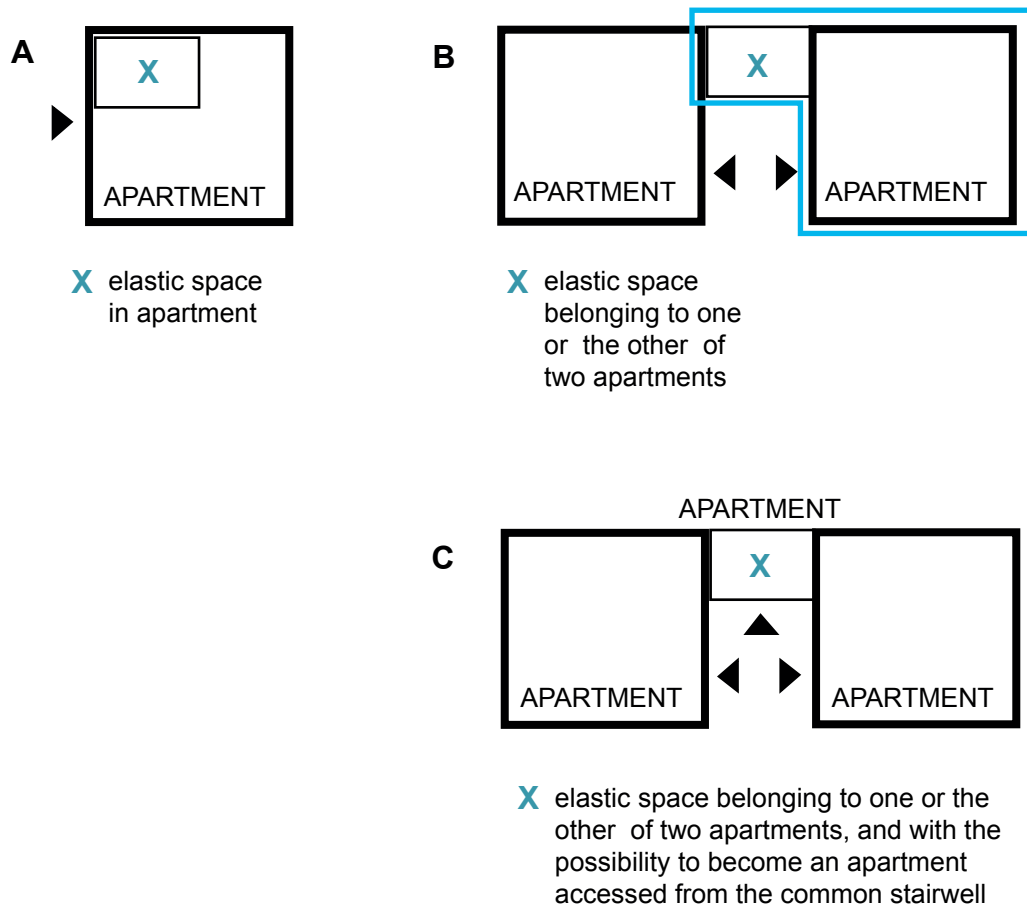


FIGURE 4 The elastic space can be one or several rooms. In this thesis I rank three levels of elastic layouts from least to most elastic. If the elastic space has its own entrance to the common stairwell and is equipped with bathroom and cooking facilities it can become a separate apartment: A. First level of elastic space, B. Second level of elastic space, C. Third level of elastic space, in which the space can become a separate apartment (most elastic level) (my interpretation).

An *elastic* layout is one in which the apartment's space can both expand and contract in size. Often this is accomplished through the exchange of space between adjacent dwellings. In this thesis I add a feature to this perspective by ranking elastic layouts by degree of detachment—the extent to which a space can be separated to form a new apartment (Figure 4). The least elastic kind of layout (first level) is a relatively secluded room within the apartment that can be used by a teenager to get more privacy, for example, or rented

out because of its strategic proximity to the entrance, bathroom, and kitchen. The second level of elasticity is one or more rooms that can belong to either of two dwellings, and in the third level these rooms can become separate apartment units accessed from the common stairwell.

Elastic schemes providing a separate dwelling can be found in research from as early as the 1940s (Åkerman, 1941, p. 241). Here the provision of an extra bedroom that is semi-detached from the apartment, with its own entrance from the stairwell, washbasin, and wardrobe, is regarded as a quality. It is meant for a teenager in the family, but can also be rented to a tenant to provide some extra income to the household. This type of arrangement is also described in the 1982 report *Housing: usage, design* (Bostaden: användning, utformning, Gaunt, 1982, p. 34). Here the separate unit is called a *supplementary apartment* and described as a semidetached room that can be used by the family teenager or grandmother, for example, or by a tenant. The supplementary apartment has a separate entrance, bathroom, and possibly some provision for cooking.

The type of adaptable layout with the ability to crop off one part of the apartment is discussed in the report *Adaptable housing: applications and consequences* (Anpassbara bostäder – tillämpningar och konsekvenser, Wiktorin, 1975, pp. 26–29). It is seen as a qualitatively enriching design scheme that allows the property manager over time to offer more diversified apartment sizes as demand in the housing market changes. The report concludes that a downside of this approach is that these types of changes may only be possible prior to the completion of the initial construction, since changing the apartment sizes after the units are occupied can be logistically challenging.

1.3.3 *Other concepts and notions applied*

The other concepts and notions used in the thesis are presented here: The concept of *Socially expected durations* (SED) (Merton, 1984) is used to understand the time perspective focused in the thesis, with the household's spatial use over time, and the social aspects related (2.3.3).

To frame social sustainability dimensions Murphy's (2012) framework is used, with the four dimensions: *social cohesion, participation, equity*, and *awareness of sustainability* (Braide Eriksson, 2016, pp. 27–30) (1.4).

The notion *current apartment design* in this thesis means the currently dominant mode of apartment design as prescribed in Swedish norms and standards (Boverket, 2015, pp. 51–66; Swedish Standards Institute 2006a; Swedish Standards Institute, 2006b).

The notion of *life course* is understood as the events that mark the transitions and trajectories of roles that extend across someone's life span (Alwin, 2013; Collins, 2018). This can mean, for example, the time of family life and raising children, or the time of establishing oneself on the labor market or studying at university as a young adult.

The notion of *spatial capacity* in this thesis means the apartment's spatial capacity to host diverse living situations in terms of both functional and social use. The point of departure is Swedish housing conditions and current standards for housing with traditional use of the space in an apartment. The focus is on owner-occupied or rental housing units in multi-family residential buildings in urban locations in Sweden, which account for 48.2% of Swedish households today (SCB, 2018a). The term apartment will be used here.

Household in this thesis refers to the person or group of persons living in the same apartment, including lodgers, regardless of where they are permanently registered. For example, students permanently registered in another municipality count as belonging to the household (SCB, 2018b).

Some concepts and frameworks are also used in the thesis, the aforementioned adaptable concepts, generality, flexibility, and elasticity, define as presented spatial strategies for adaptability.

The notions and concepts will be applied in the context of *Middle range theory* (MRT) (Merton, 1949), theories between the all-inclusive theory structure, and the minor necessary working hypotheses. MRT will be discussed in 2.3.3, but before that I will present the essential results from the licentiate thesis.

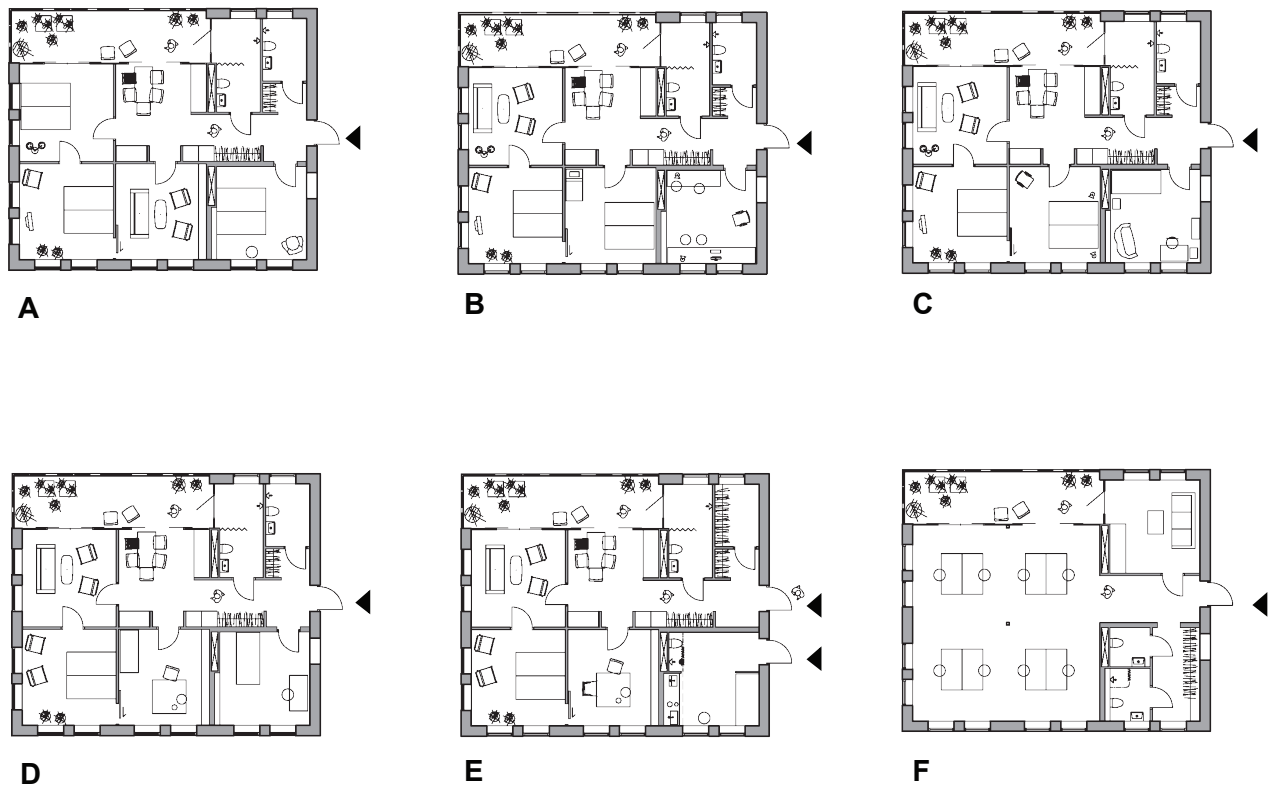
1.4 RESULTS FROM THE LICENTIATE THESIS

This thesis includes the licentiate thesis I wrote previously, *Residential usability and social sustainability: Towards a paradigm shift within housing design?* (Braide Eriksson, 2016). My licentiate thesis can be seen as outlining a broader perspective on the question of adaptable design schemes, social dimensions, and the future sustainability of the housing stock, while the continuing research narrows the focus to the question of the capacity of adaptable apartments, spatial use over time, and social dimensions in the neighborhood.

My licentiate thesis investigates the correlation between apartment adaptability and aspects of social sustainability. Demographic transformation and apartment utility together constitute the background for the publication

(Braide Eriksson, 2016, pp. 9–24), and social dimensions are understood in terms of Murphy’s four dimensions: *social cohesion, participation, equity, and awareness of sustainability* (Murphy, 2012) (Braide Eriksson, 2016, pp. 27–30). The four dimensions are in the thesis social aspects related to the household’s dwelling context (Braide Eriksson, 2016, pp. 26–30). Thus, participation is understood as *user participation*, and awareness of sustainability relates to the household’s awareness of how spatial use can effect social dimensions and sustainability (Braide Eriksson, 2016, pp. 28–30). The concept social sustainability, as well as the social dimensions involved are understood as contextual (Braide Eriksson, 2016, pp. 26–30). This means that they can only be understood in the context of the given situation and not generally evaluated or assessed. The space, time, and persons involved all are variables that frame the assessment (Braide Eriksson, 2016, pp. 26–30). This means that social dimensions that are found related to the access and employment of adaptable space not applies to every living situation. The research in my licentiate thesis involved two studies, Study 1 and 2, and the methods I used were based on qualitative research and performed with a mix of methods, employing empirical studies and a ‘research by design’ component. The work was performed in collaboration with the PFH research platform and the Viva project as described in 1.2. The methods are described in greater detail in Chapter 3, Methodology, in which the methods and research questions for the thesis are described as one research process (including the licentiate thesis).

My licentiate thesis shows three key results (Braide Eriksson, 2016, p. 79). One is that an apartment’s capacity to adapt to a household’s spatial requests and needs can be correlated to aspects of social sustainability. Here the equity dimension stands out as a critical aspect. The second key result is the articulation of a living process and the need for the use of space over time to be a critical component in a housing design discourse that embraces social sustainability dimensions. The household’s changing spatial needs highlights the question of adaptable apartment layouts. Here a design model for understanding spatial needs over time is developed through research by design work in master of architecture studios, this model I have named the time-space model (Figure 5). The third key result is the identification of the gap between the households’ spatial requests and needs and the kind of apartment design currently being provided.

**FIGURE 5**

Example of an apartment's spatial capacity visualized with the time-space model.

1. Dwelling community. Three couples share apartment.
2. One couple moves out. One of the residents has a home office.
3. One couple have a child.
4. The couple with no child moves. The other couple stays and after some years they have another child.
5. After many years the couple still lives here, the children have moved and the room next to the entrance can be used for tenants, meaning an extra income.
6. The apartments in the multi-family building become difficult to rent out and some of them are refurbished to work as office space instead.

Project by master of architecture students Ylva Frid and Sofia Wendel from the master studio Housing Inventions, 2012.

1.4.1 Further development of the licentiate thesis

The first and second key results of my licentiate thesis are further developed and deepened in the continuing research. The first key result, the adaptable dwelling's correlation to social sustainability dimensions, is followed up with focus on the social dimensions in the neighborhood; the second key result, showing the living process as a salient issue for housing design and aspects of social sustainability, is developed and deepened using the time-space model to describe the households' spatial need over time.

The issue of the social dimensions in the neighborhood is taken further, as it is found to be a critical aspect in the family life course situation when the household expands and contracts as described in 1.3.1. The empirical studies in my licentiate thesis suggest that households prefer to stay in the same neighborhood during the time when their children are growing up. This is due to the desire to maintain continuity through daycare and school, and to take advantage of the social benefits found in close proximity to the home or the surrounding neighborhood. Here aspects such as safety, social cohesion, social interaction, and sense of belonging play critical roles in the choice to stay in spite of changing living conditions and changing spatial needs in the apartment (Braide Eriksson, 2016, pp. 48–51, 80). The spatial use of apartments during this family life period of time constitutes the point of departure for Study 3, Living processes, the empirical study conducted in this thesis.

1.5 THE RESEARCH FIELD AND POSITIONING THIS THESIS

The knowledge field of adaptable housing has been constructed through theory from research as well as through design practice, conceptual design projects, and realized building projects.

1.5.1 Research field focus

The research often focuses on two questions. One is the design matters: floor plans, room configurations, and/or building configurations. The other focus that is often expected in research today is sustainability—environmental, economic, and social—and often the combination of social and environmental sustainability is emphasized as a strong motivation for adaptable apartment design.

When considering the period of family life and the use of space over time, the temporal aspect can be seen as already inscribed in the conceptual idea of adaptable design, as the desire to accommodate changing needs over time constitutes the basic precondition for the use of adaptable space designs. Time

can therefore be regarded as fundamental to the need for adaptability. This means that all research in one way or another relates to time. When scanning the research field, these three different foci—design, sustainability, and time—are common components in existing work and often figure as interlaced factors.

I will here present an overview of this field, spanning from research to theoretical design ideas for floor plans to realized adaptable housing projects that I find relevant. I will also narrow down and survey research that has a focus similar to this thesis—that is, floor plan design, social dimensions, and the issue of spatial use over time in an apartment. Lastly I will position my thesis in a Swedish context. However, research that focuses primarily on issues of environmental and economic sustainability are not included in this survey.

1.5.2 *The research field*

In research focusing on adaptable design, theories about beneficial adaptable layouts abound, and there is no dominant direction at present; instead, the research field can be seen as a laboratory where many approaches to design are flourishing. However, most of the research aims to establish some type of design thinking. Tarpio (2015, 2016) takes a holistic approach to design. He maps spatial layouts and spatial thinking that generate adaptable apartments, framing a theory of the spatial logic of apartment adaptability, and he challenges some common practices in housing design, including modernism's tight-fitting functionality.

The design focus on adaptable housing is often combined with the subject of social sustainability. One social aspect emphasized in several studies is the current and future demand for more diversity in apartment design layouts—the unpredictability of the future, where adaptable housing is seen as a way of acquiring a more sustainable housing stock. Another common social aspect is the empowerment of residents—enabling them to make their own choices for adjustments to accommodate their personal needs and preferences. This can provide a sense of control over their living situation and consequently become a force for identification with the home. I will provide a survey of research with these focus areas below.

Friedman sees flexible and expandable home design as targeting economic and social sustainability dimensions. In *The grow home* (Friedman, 2006), he proposes the adaptable home as a response to the issue of affordable housing and the changing constitution of a family as it expands and contracts. Manum (2005, 2006) starts from existing design examples, focusing on apartments in the Norwegian housing stock, and investigates

the prevalence of generality in apartment layouts—space that provides for diverse uses—with the assumption of a future increase in the diversity of needs and preferences among residents.

Leupen (2006a) and Krokfors (2017) both take social aspects as their point of departure—the unpredictability of future housing needs, the likely increase in the diversity of those needs, and the longevity of the housing stock as critical preconditions—and advocate for design with adaptable layouts. Leupen’s work primarily addresses design, analyzing existing housing examples and presenting a method for working with adaptable space that separates the “frame” from the content and makes the frame a generic space wherein change can occur. Krokfors focuses instead on sociocultural and ecological issues. She presupposes a typological adaptability that can promote self-organization, and describes a living space that encourages “the creative resident” to use it spontaneously. The resident becomes “the creative dweller” (p. 210). Her focus is on the residents’ self-conditional use of their space as a way to promote their power over their own dwelling space, but also to promote sociocultural sustainability in urban areas. The residents’ self-conditional use is also featured in a central work in the field, *Supports: an alternative to mass housing* by Habraken (1972). The book is based on his research and describes methods for the design and construction of adaptable housing. It was first published in 1961 and caught attention in the debate on mass housing during the 1960s and 70s. The book focuses on the empowerment of residents and on user participation, with the idea of an open building structure that acts as a support that can be disposed and adapted to function for the residents’ needs.

The work of Hillier and Hanson (1984) also makes a relevant contribution to the research field of adaptable housing with the Space Syntax method. The authors present an analytical tool that makes it possible to uncover how spatial configurations generate movements and meetings in space, and thus to better understand the spatial and social qualities in the design of floor plans. The method also identifies nodes for movements, so it can also help us understand the configuration of adaptable space. Research in the field often involves analysis and design of floor plans, and the Space Syntax method is used occasionally in research, including several of the projects described above.

The time aspect is also accentuated in a recent cooperative research effort by the Delft University of Technology and the School of Architecture at the Royal Danish Academy of Fine Arts (2006). The researchers have shared ideas focusing on the theme of *Time-based dwelling* presented in *The*

Nordic journal of architectural research. The time aspect is regarded here as a relevant precondition for housing design. The home is seen as creating the context for daily life, where the actual habitation of a home can be characterized as time-based. These research articles present a wide scope of ideas on the subject. In *Changeable space as temporary home*, Thomsen and Tjora (2006) study a student housing development called Tre Stykker that was built in a student workshop in 2005. The term time-based here denotes a non-permanent building in which the interior space can be adapted to different needs over time with the help of movable elements.

In *Polyvalence, a concept for the sustainable dwelling*, Leupen (2006b) takes a different perspective and applies the notion of *time-based* to the question of the longevity of the housing stock. He sees polyvalent space and spatial systems as responding to diverse needs and different forms of habitation. He emphasizes the importance of providing a hall that allows every room to be reached from a central and neutral point as a key to increased spatial usability.

In *Situations of dwelling: dwelling suiting situations*, Duelund Mortensen, Welling, Livö and Wiell Nordberg (2006) investigate how apartments with open-plan layouts can respond to changing family patterns. The study is based on information from residents in new housing developments in Copenhagen, and analyzes floor plans based on residents' use of space and living situations. The authors' aim is to develop concepts and models that are applicable in new projects. They identify three conditions that are each connected to a different measurement of time. The conditions are *static condition*, defined as the building's permanent features with determined functions; *suitable condition*, the apartment's capacity for physical displacement and *situational condition*, the undefined "raw" space. These can be applied at the scale of either an individual apartment or an urban environment.

In *Life transforms living transforms life*, Loch (2006) reviews recent adaptable housing projects. She emphasizes that interest in adaptable housing is on the rise and that openness, adaptability, and individually interpretable spaces play an important role today. A strong emphasis in these adaptable housing projects is the diversity of specific lifestyles, and these projects aim for individual influence and personal interpretation. The author takes a critical stand in asserting that residents should be stimulated to conquer space instead of conditioned in their behavior.

The work of Beisi (1995) brings up yet another relevant question for adaptable housing. He focuses on concepts of adaptability and the issues of

spatial usage of adaptable strategies in relation to knowledge and management. The study involves four completed multi-family residential buildings in Switzerland, analyzing the quality of the adaptability together with the issue of information (among architects, owners and tenants) and the management methods to achieve adaptable housing.

1.5.3 *Positioning this thesis*

This thesis focuses on the issues of adaptable apartment floor plans and the life course period during which the household expands and contracts. It can be seen as related both to modernist housing design from the 1930s and onwards in Europe, in which accommodating an expanding and contracting household was a salient target, and more specifically to Swedish research, conceptual design projects and realized housing projects in which floor plans based on ideas of adaptable housing were developed from the 1930s to the 1970s. The expanding and contracting of the household as well as the question of the household's transformation of dwelling space is a salient feature in some contemporary research projects, but the holistic approach in that research takes a different perspective than the one in this thesis.

During the 1930s Dutch architects demonstrated great concern for the habitation process both in theory and practice (Eldonk & Fassbinder, 1990, pp. 23–33). One of the earliest modernist housing projects to address the issue of adaptable floor plans and the habitation process is the *Woningenkomplex Vroesenlaan* designed by Van den Broek in 1934. The floor plan is designed with the idea of adaptable space to respond to changing cycles of use at the level of daily use and at the level of daytime and nighttime use (Eldonk & Fassbinder, 1990, pp. 23–33; Schneider & Till, 2007, p. 65). The strategy that in my licentiate thesis was identified as a critical tool for visualizing the living process and spatial use in the apartment and that I named *the time-space model* (Braide Eriksson, 2016), can be seen applied in floor plan studies from this time (Eldonk & Fassbinder, 1990, pp. 23–33). One example is a conceptual project from 1934 by the Dutch architect Leppla, collaborating with Van den Broek. He conducted research into the utilization of requirements of an apartment with detailed studies of the processes of daytime and nighttime use, also focusing on the family's life phases (Eldonk & Fassbinder, 1990, p. 29). The project presents a type of time-space model projecting the spatial use with furnishing in a four-room apartment where the adaptability is supplied through daytime and nighttime use of the apartment space, and the household expands from two persons to seven (Eldonk & Fassbinder, 1990,

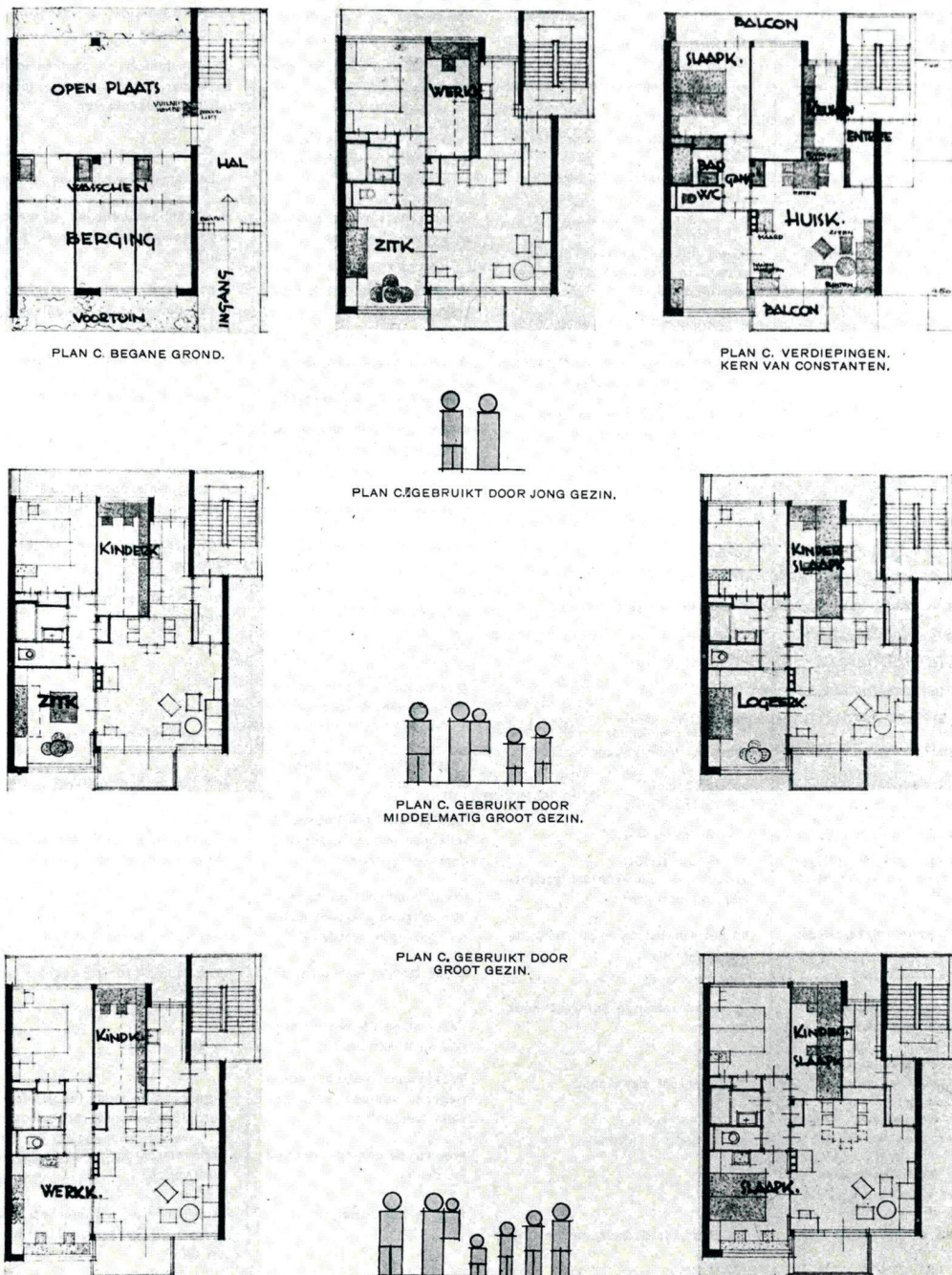


FIGURE 6 Leppla's conceptual project, featuring the time-space model with the use of space and the household's expansion (Eldonk & Fassbinder, 1990).

p. 29) (Figure 6).

A later example of a conceptual project of adaptable apartments that focuses on the expanding and contracting of the household, and also applies the time-space model, is the project *Flexible Housing* from 1986 by the Danish architects Tegnestuen Volden. The project is the winning entry to the competition *Flexible housing for the young and the old* implemented by the Danish Ministry of Housing (Schneider & Till, 2007, p. 98). The project presents a time-space model with floor plans featuring one household's expanding and contracting during a longer time span, from a collective living situation as young adults through years of family life with children into life as elderly retirees. The apartment floor plan consists of general-space rooms combined with elastic space, enabling residents to increase the apartment size as the household expands and to reduce it when the household contracts.

In Sweden, ideas about the household's life course have been a recurring reason for designing adaptable floor plans. The conceptual project *ABV Housing* (ABV-bostaden, Olivegren, Olofsson, Palm, Wallin & Åberg, 1971) treats the subject of housing design in relation to household needs. The architects proposed to categorize apartments by their floor area rather than number of rooms, and recognized the household's life course as a precondition for its need for living space. Two realized housing projects also provide examples of the idea of a household's spatial needs evolving with its changing life course situation, the Experimenthuset in Järnbrott (1953) and Västra Orminge (1964–71). Here various layouts were presented for each apartment to accommodate diverse household compositions with the presumption of changing spatial needs (William-Olsson & William-Olsson, 1954) (Nilsson & Åhlund, 1974).

The research, conceptual projects, and realized housing projects presented above often take a top-down perspective from which the understanding of adaptability and the living process is constructed through floor plan designs, sometimes using the time-space model. This thesis applies the strategy with the living process and spatial use in the apartment presented as floor plan designs, but it relies on empirical studies of living situations—a bottom-up perspective. This approach is found in some of the surveys of apartment design conducted in Sweden from the 1950s to the 1980s, such as *Family and dwelling* (Familj och bostad, Holm, 1955a) and *Residential design, housing use: the dwelling in norm and reality* (Bostadsutformning, bostadsanvändning: bostaden i norm och verklighet, Lindquist, 1980). The development of housing design in Sweden, with its attendant research into adaptable

apartment planning and the issue of life course and the household's changing spatial needs, provides an understanding of the current dwelling design focus, for this thesis. I develop this topic further in Chapter 2.

In the recent research mentioned previously in section 1.6.2, the topic of adaptable living space and the idea of expanding and contracting an apartment to accommodate changes in a household over its life course can be seen in the project by Friedman. He explores the idea of the expanding household and the adaptable home in *The grow home* (2006). However, the book has a different focus than this thesis: it takes a holistic approach to single-family homes and row houses as sustainable housing that concentrates on the household's housing expenses and its ability to expand the home as the family grows. Another research project mentioned in 1.6.2 that more closely aligns with the questions in this thesis is the one by Duelund et al. (2006), which investigates how households inhabit and transform their living space. The project comes close to this thesis in its point of departure, the household's use of living space and the study of different types of adaptable solutions, but it focuses on the floor plan's capacity for transformation generally rather than its specific ability to expand and contract. It evaluates and discusses adaptable designs not in terms of their capacity to enable the household to expand and contract but in terms of architectural qualities such as public and private, room proportions, daylighting, and circulation. The project focuses on developing concepts and models that are applicable in new projects.

The study by Beisi (1995) is also relevant for this research, as it emphasizes the relevance of information and knowledge as well as the management of adaptable concepts as having a major influence on the employment of adaptable space (1995, pp. 160–161). The study also applies a bottom-up perspective, understanding spatial use of adaptable concepts from the residents' viewpoint and the employment of adaptable space as a process over time (1995).

The thesis by Krokfors (2017), also presented in 1.6.2, addresses the same issues as this thesis—adaptable dwelling space, the household's living process, and the subject of social sustainability—but her thesis takes another perspective on these issues. However, the approach suggests an interesting perspective regarding the focus I apply in this thesis. Krokfors relates the living process to the use of adaptable space and the well-being this promotes when enabling the household to define the use of spaces in their own possession (2017, pp. 18–20). This use of adaptable space, she stresses, also serves social sustainability: the dwelling space ought to be adaptable to allow the

household to change as new needs arise. The household ought to be able to define its own use of space and work out creative solutions, allowing residents to be what she calls *creative dwellers* (2017, pp. 210–211). This living process with the creative use of space, Krokfors stresses, can benefit society in wider contexts and promote all kinds of social innovations that contribute to social sustainability (2017, p. 210). In this way the residents' self-conditional use of space is seen as a bottom-up solution contributing to sociocultural sustainability of urban areas as well as individual and communal well-being (2017, pp. 22–23). She also emphasizes that adaptable dwelling space should be *self-organizing* and examines the different modes of the production of self-organizing qualities of space (2017, pp. 212–285). The approach in Krokfors's thesis, in which the household's self-conditional use of space enables sustained communal well-being, comes close to the focus in this thesis. I focus on the household's conditions for spatial use when they want to stay in the same neighborhood despite changes in their spatial needs, and find that these conditions are related to aspects such as safety, social cohesion, social interaction, and sense of belonging—aspects that can serve social sustainability dimensions in the close community and surrounding neighborhood.

In surveying the field of research, I have not found research projects that focus, as this thesis does, specifically on the family life course with its need to expand and contract and how this relates to adaptable space and social dimensions in the neighborhood. What is distinctive about this thesis is its close examination of the expanding and contracting household, and how this is analyzed and related to spatial use in the home. The connection to the PFH research project and the realization of the Viva development (1.1.4), also give this thesis a distinctly future-oriented profile. Viva will, when completed, constitute a challenging and unique opportunity to follow up on how apartment design relates to social sustainability. When the residents have settled in, the project can be evaluated from a social sustainability perspective and the actual outcome can be compared to the original intentions of the design. This can contribute to building a more comprehensive knowledge base for the subject of adaptable housing.

1.6 STRUCTURE OF THESIS

In this thesis Chapter 2 presents two cornerstones for the work: the emergence and development of current dwelling design, and the established ideas

about the household's spatial use over a period of time. The development of the current dwelling design I see as a critical precondition for the understanding of how adaptable space, and the household's spatial use over time, are conceived of in the present dwelling design context. The chapter is concluded with reflections on this topic, and the theoretical considerations for the thesis are presented with the theoretical approach and the concepts and frameworks that are used in the research.

Chapter 3 presents the methodology for the whole thesis, the research approach and research design and the three studies conducted (including the licentiate thesis, Braide Eriksson, 2016). Each of the studies is presented with the research questions, methods, and analysis made. The last paragraphs present the reliability and validity, and the ethical considerations for the research.

Chapter 4 presents the results for the complete thesis and makes a more thorough presentation of Study 3, Living processes (including the licentiate thesis, Braide Eriksson, 2016). Study 3 consists of an empirical study performed with interviews with households supported by illustrations of furnished floor plans of the apartments. The presentation also features spatial diagrams showing the households' living processes, and some of the households' spatial narratives.

Chapter 5 presents analysis of the social qualities related to the households living situations, spatial requirements and spatial use over a sequence of time. Synthesizing the research of the whole thesis, and forwarding the social dimensions from Murphy's framework (Murphy, 2012), to reflect both positive and negative qualities of social aspects related to the households' use of dwelling space.

Chapter 6 concerns the design of adaptable apartment space, and presents a number of adaptable design schemes from apartments in Study 3, Living processes. The analysis of the design schemes relates to the results from study 3, addressing three adaptable concepts generality, flexibility and elasticity. The main focus in this chapter involves the households' spatial use, but also the accumulated experiences of adaptable apartment space from the development of the current dwelling design, that constitute critical knowledge on the subject. Lastly the issue of accessibility is discussed, this question is critical for the employment of adaptable space, and also reveals the equity-dimension-qualities embedded in the adaptable space concept.

Chapter 7 recapitulates the whole thesis (including the licentiate thesis, Braide Eriksson, 2016), and discusses two critical issues. One concerns the

social dimensions and the inevitable pattern with recurring spatial changes due to the household's life course situation and living process, the other concerns how the spatial and social qualities of adaptable space can be seen as challenging the focus for the current dwelling design.

Lastly Chapter 8 presents the concluding remarks, addressing the question of how adaptable space can be understood, from a social dimension perspective as well as from a design perspective, and the issue of how progress can be made toward apartment design that includes adaptability. The thesis is concluded with directions for future research.

2 THE FORMATION OF A DWELLING DESIGN FOCUS AND THE ISSUE OF ADAPTABILITY

People's relationship to their homes is constantly changing based on changes in family configuration, aging, new space-demanding interests, etc. I think it's important to emphasize the changeable character of our relationship to the home (Nordström, 1986, p. 40).

The sentiment above may seem obvious, but how do we conceive of the living process, understood as spatial use over time, and the issue of adaptability in apartment design today?

In Sweden the question of apartment adaptability has had its peaks through the years. There are several interesting examples materializing the idea of an adaptable design, but on the whole the concept has not substantively changed the way apartments are designed. This thesis contemplates the question of adaptable apartments from a historical context in order to learn about the subject and the reasons for the concepts' low impact, but also from a contemporary perspective as a still viable and valid design strategy worth scrutinizing. To understand the ideas that guide today's apartment design and its attitude toward adaptable apartment solutions I will describe some of the main features on which current design focuses and examine the issue of adaptability within this context. I will also present how the concept of the mobile household has resulted in more static apartment design that limits an extended spatial use. I will concentrate on the Swedish context with some exceptions, such as where I describe the larger context in order to anchor the subject within a broader perspective. I examine the Swedish government's involvement in housing as a social issue; housing research as a critical factor in forming and establishing a perspective on apartment design; and the design itself, with function as the dominant factor in analyzing how people live and form their homes accordingly.

2.1 THE EMERGING FOCUS OF HOUSING DESIGN

The apartment design practiced today is influenced by modernism and was developed during the years of the *Folkhemmet*, or People's Home, a sociopolitical movement spanning from the early 1930s through the mid 1970s that treated housing a social welfare issue. During this time the modern movement became a part of the political platform for solving the housing question, and politics together with housing research and housing norms have to a large extent shaped the way apartments are designed and how we conceive of the apartment's spatial use today. During the People's Home period, the issue of adaptability as an answer to the living process was considered relevant and was for years a recurring topic of discussion, but it eventually became a deselected track and was overtaken by another focus.

2.1.1 *Politics and the social assignment*

The modern movement can be seen as a tool for social ambitions. In Europe during the 20th century it became the answer to many of the questions that followed from rapid urbanization, the population growth of cities, and overcrowding due to industrialization.

In Sweden, modernism's social ambitions for addressing the growing housing crisis positioned it well for a substantial breakthrough. Housing conditions were severe, with most people living in small and low-standard homes, often with only one room and kitchen with insufficient sanitary provisions for a family with many children. The poor housing conditions were blamed for disease and premature death (Nylander, 2013, pp. 19, 22, 66). It was determined that this crisis could be solved with the help of ideas embedded in the modern movement.

By the 1930s, when the Social Democratic Party took control of the government, the housing standard had become one of the lowest in Europe (Nylander, 2013, p. 65). To address the situation, the government established a program called the Study of *Housing and Its Social Impacts* (Bostadssociala utredningen) (Nylander, 2013, p. 66). The political direction that emerged from the investigation has been described as a transition from selective to general in the sense that it aimed to improve housing conditions for all people (Bostadshistoria, 2017; Nylander, 2013, p. 74). The Social Democratic Government also introduced the People's Home movement, which was to become a strong political tool for addressing the housing crisis (Nylander, 2013, p. 65). It imposed an alliance between state and capital and demanded quality housing for all people, buoyed by the mottos of solidarity and com-

munity for the collective (Mattsson, 2010, p. 76; Rudberg, 2010, p. 153; Nylander, 2013, p. 65). The movement meant that the government gradually took over the responsibility for housing, which had previously been left to the market. Ideas for qualitative housing could now be developed through government-financed research (Nylander, 2013, p. 65).

The government's role meant that social welfare became a focus. The work to improve housing standards for the people was conducted through different strategies, one of the most important of which was the introduction of a norm for crowding. Norm I was formulated from the Study of Housing and Its Social Impacts in the 1940s (Boverket, 2006, p. 24). The norm established overcrowding as more than two persons for each room in the dwelling (kitchen excepted). This was later developed into Norm II and eventually the norm we have today, Norm III.³ This norm was implemented in the mid-1980s as a way to increase the spatial standard for Swedish households, and it was a political issue during this time that every child should have a room of their own (Boverket, 2006, p. 12). The norm's foremost aim has been to establish a basis for appropriately subsidizing housing. The norm with its directives has shaped the way we conceive of spatial use today in the professional practice of apartment design: one room (bedroom) for each household member, with the exception of co-habiting adults that share a bedroom, has set the standard for the floor planning.

The norm frames the most apparent experienced factors perceived in overcrowded situations: a lack of privacy for personal development and an overload of stimulation and interaction. The number of persons for each room therefore becomes the relevant measure for overcrowding, and the supply of rooms in the apartment becomes a critical factor (Boverket, 2006, pp. 12, 19). Overcrowding results in practical consequences but can also affect both physical and mental health for both adults and children. The problems identified affect primarily children and families with children (SOU, 1986, pp. 47–48).

2.1.2 *Modernism and housing design*

The modernist style was debated among architects, and in 1928 the CIAM (Congrès Internationaux d'Architecture Moderne) brought together architects from many countries that shared an interest in the new style (Mumford,

3 According to Norm III a crowded living situation means having less than one room for each household member, kitchen and living room excluded. With co-habiting adults the need decreases by one room (Boverket, 2006, p. 9).

not dated). The organization took a function-based approach to both urban planning and housing design. Their strategy for urban planning involved the rational siting of functionally distinct elements such as workplaces and transportation centers and divided the city into four separate zones for housing, work, recreation, and transportation. The planning of housing was dominated by the ideas for functional design (Mumford, n.d.). The modernists viewed the home the way they viewed a car or an airplane: it was to be studied based on its functions with a methodology that was an exact science (Sandström, 1989, p. 127). The compact home became a common focus for architects. Decreased living space with functional differentiation would produce more effective designs offering qualitative living and affordable housing for the people.

In Sweden the new style was named functionalism, and it embraced the idea of a new society and a new type of man. The Stockholm Exhibition of 1930 is regarded as one of the starting points for functionalism in Sweden. It was a housing and industrial design exhibition that presented a new modern way of living. Swedish architects, like their European counterparts, were looking for support within a modernist design paradigm that was anchored in reality and had a scientific basis. The point of departure for this was a critique of the existing housing design paradigm and the prevalence of poor housing conditions, and the solution they envisioned was the People's Home (Linn, 1980, p. 138). This provided a strong foundation that was developed with the idea of the function-based home and supported by science and publicly funded research (Krantz, 1985, p. 96). As a precondition for the research, modernist design objectives were also transformed into the housing norms that established the conditions for government loans for housing construction. This result was a strict implementation of modernist design ideas. Nils Ahrbom, one of the architects of the Stockholm Exhibition, described in retrospect how the architects of the 1930s saw functionalism as a quest for truth in every task's exceptional quality:

We found it, we thought, in structural clarity, in the logically executed circulation of the floor plan, and in the unconditional analysis of spaces and groups of spaces (Ahrbom 1980, p. 134).

Ahrbom's description reflects some of the design logic that came to dominate the view of what home life was all about. The home was divided into specified and measurable units, and in this way the goals for housing qualities could be structured and clarified. In the 1931 *Acceptera* manifesto (Asplund,

1980), the ideal configuration of the home was described as the smallest possible area divided in rooms for different functions: food, social gathering, and sleeping. These three functions were identified as the basic features of modern housing construction (Asplund, 1980, p. 59). Today's apartment designs are still profoundly indebted to early modernism's understanding of housing design and its conception of how space is used in the home.

2.1.3 *Housing research: justifying a design focus*

Housing research played a critical role in Sweden in legitimizing functionally specific design and establishing measurable design logic as the optimal direction to take. From the outset many of the research studies were performed in what was called the laboratory. Here household work and the apartment's furnishings were studied in full-scale models, each element of the work measured, timed, and analyzed to achieve a maximally efficient organization of the interior design and equipment (Kuchenbuch, 2010, pp. 162–163; Rudberg, 2010, p. 156). The research was based on assumptions such as the nuclear family, functionally specific rooms dimensioned for prescribed furnishings, and preconceived ideas of family life.

Throughout the 1940s, the research developed with field studies of how people actually lived in their homes, collecting data on real-life situations and living habits (Kuchenbuch, 2010, p. 163). During the same period, the National Construction Loan Bureau (Statens Bygglånebyrå) began publishing norms and recommendations for the design of housing, a first step towards what would eventually become today's housing norms. The number of norms expanded with every new edition.

From 1939 to the 1950s, a number of studies of apartment use were conducted that would become the foundation for the practice of designing apartment floor plans. These included titles such as *Home and Household Organization* (Bostad och hushållsorganisation, Bugge, 1936), *The Family that Outgrew Its Home* (Familjen som växte ur sitt hem, Åkerman, 1941), *Mother and Child from Morning to Night: A Study of Eighty Children's Environments* (Mor och barn från morgon till kväll: En studie av 80 barns miljö, Boalt & Carlsson, 1949), and *Family and Home* (Familj och bostad, Holm, 1955a).

But despite the science-based design, there were recurring criticisms of the norms and of apartment design during these years (Sandström, 1989, pp. 144–152). Critics claimed that the new style produced a static and functionally specific design whose exclusive focus on average conditions and functions left no room for a diversity of households. A discussion also emerged

regarding whether apartments should be designed for spatial use as concluded from research in the laboratory (top-down perspective) or from the living habits detected through field work (bottom-up perspective) (Kuchenbuch, 2010, pp. 160–163). The question of a top-down or a bottom-up perspective was also frequently seen as a two-way learning process and not necessarily a conflict (Kuchenbuch, 2010, pp. 160–163). This polarizing debate between functionally specific design and a more diverse and adaptable approach came up repeatedly in 1940s and 50s, and again in the decades that follow (Sandström, 1989, pp. 151–157; Holm, 1955b, William-Olsson & William-Olsson, 1954; Gåsste & Tranaeus, 1970b; Edström, 1975; Krantz, 1975).

2.1.4 The end of public housing development

From 1945 onward, the goal had been to end the housing shortage with the construction of new housing. By 1960 the effort seemed to have failed (Nylander, 2013, pp. 149–151). In 1964 the Parliament took a decision to build 100,000 new units of housing a year for a period of ten years, a project that came to be known as the Million Program (Miljonprogrammet) (Nylander, 2013, pp. 149–151).

An increased industrialization of housing construction with rationalization, simplification, and large-scale projects made this possible. The mass production of housing eventually sparked protests, and during the 1960s the social benefit of the program was questioned and there was yet another debate between what was seen as static and functionally specific apartment design on one hand and a more diverse and adaptable approach on the other, but this time it also included criticism of large-scale and rational housing schemes. This critique was also followed by a research study to evaluate the relevance of Sweden's housing norms. The preface to the report *Housing Design and Housing Use* (Bostadsutformning och bostadsanvändning; Gaunt, 1982) offered a critique of precise design:

The fact that our homes, which are typically built to be used for a period of at least 50–75 years and inhabited during that same time by households with dramatically changing habits and requirements, are planned around norms with excessive precision and a style of formulation that is probably not always appropriate for the qualities it intends to guarantee (Gaunt, 1982, preface).

This led to a discussion about the wide range of spatial needs an apartment needs to satisfy versus the prescriptions for precise dimensions that limit spatial use and the potential conflicts between these two. This discussion resulted in the norms being simplified from the end of the 1970s to allow for a broader interpretation that could accommodate more diverse solutions.

During the 1970s the housing construction boom subsided and the Million Program was ended due to a recession and oil crisis. Demographic changes, including fewer young people and less immigration, resulted in a dramatic reduction of the demand for housing. The housing shortage was now replaced by a surplus (Nylander, 2013, pp. 191–192). It was publicly declared that the housing shortage and overcrowding problem had been solved (Nylander, 2013, pp. 191–192).

During the 1970s, the housing norms were no longer used as a condition for construction loans; instead they became general demands valid for housing construction even without publicly financed loans, and the production of housing in time became more exposed to market forces. The question of the general versus the specific was to become a standing issue in the debate until the 1980s, when it disappeared. Since that time, the discussion of apartment design based on predefined functionality and precise dimensions has declined. There have been small changes in the housing norms, but to a large extent this has not affected how we understand apartment design and the apartment's spatial use.

The strong alliance created between housing research, the modern movement, and the idea of the function-based home described above, together with the political agenda, has helped to establish a strong foundation for the apartment design approach and the high housing standard we have in Sweden today. The criticism that recurred for many years has waned and the function-based approach to apartment design still lingers, and our view of living and how it should be conceived of still builds to a large extent upon this static design model. Adaptable homes have been a recurring issue throughout the process of establishing the focus of apartment design in Sweden, and adaptability been considered an important quality in some instances, but it has not had a major impact on design and construction through the years. Below I review the role of adaptable apartments in the modern design movement and the position of adaptable apartments in Sweden today.

2.2 RESIDENTIAL HOUSING ADAPTABILITY

Adaptable housing was one branch of the practice of apartment design as it developed throughout Europe during the modern era, but only in the Netherlands the theme was systematically integrated into the development of public housing, and only there that it remains a salient issue in apartment design today (Eldonk & Fassbinder, 1990, pp. 23, 65–75). In Sweden the question of adaptable housing can be seen as part of the polarized debate presented above (2.1.3–2.1.4) between functionally specific apartment design and a more diverse and adaptable design approach.

I will present the driving forces behind adaptable housing and the role it played in the development of the modern movement and of the current apartment design in Sweden. I will review how the question developed in Sweden and offer some views of the European context as well. To understand the qualities, both positive and negative, that have been discussed and why the issue of adaptable housing is not more prominent in today's apartment design, I will concentrate on some of the research and debate surrounding the question from the 1950s through the 1970s. I will present two milestone projects from the development of adaptable housing in Sweden: Experimenthuset in Järnbrott and Västra Orminge, and show what has become of the question of adaptability today. Lastly I will provide a map of adaptable housing in Sweden today and feature some of the critical projects.

Schneider and Till conclude that three key drivers have influenced the development of adaptable housing (2007, p. 15). The first came in the 1920s as a response to the need for the housing industry to provide many new small, efficient apartments as part of European social housing programs. The adaptable use of space enabled small apartments to provide a functional and qualitative lifestyle for the household, and the small size made them affordable for more people (Schneider & Till, 2007, p. 15). The second driver of adaptable housing, started in the 1930s, was a belief that prefabrication and technical solutions were the answer to the mass production of housing. This direction of adaptable solutions is still a part of today's housing market (Schneider & Till, 2007, p. 15). The third key driver came as a reaction to the mass production of housing that took place in the 1960s. This time the renewed interest in adaptable housing was due to its capacity to accommodate user participation, with the ideal that homeowners should be afforded freedom to choose how they used their homes (Schneider & Till, 2007, p. 15). The user participation movement embraced a social perspective on the housing issue focusing on residents' needs and comfort. These three drivers are visible in the process presented below.

2.2.1 *A slow start and the first project: Experimenthuset in Järnbrott*

One example often seen as the start for adaptable housing is the Dwelling for Minimal Existence (Die Wohnung für das Existenzminimum) presented at the CIAM conference in 1929 (Kuchenbuch, 2010, p. 161). This was a small, flexible, and efficient apartment designed to solve the housing shortage and the poor housing conditions in Europe at the time. A few years later, in a competition on affordable housing held by the City of Stockholm in 1932, the architects Nils Ahrbom and Helge Zimdal presented a flexible housing project with movable walls inspired by Mies van der Rohe's flexible housing from the Stuttgart Exhibition of 1927 (Rudberg, 1980, pp. 116–118). The Swedish project was never realized. This example in a way reflects the slow progress of adaptable housing in Sweden. Although there was vibrant debate about the limitations of standardized apartment design and about potential alternatives as early as the 1930s, the first realized examples of adaptable housing did not appear until much later.

It wasn't until the 1950s, in fact, that Sweden got one of its first adaptable housing projects, Experimenthuset (the Experimental Building) in Järnbrott. The housing development was the result of an idea competition arranged by the City of Gothenburg Housing Authority as a strategy to foster new ideas for the future of housing construction (Statens Institut för Byggnadsforskning, 1966, p. 7). The project can be seen as part of all three drivers of adaptable housing. The precondition for the competition was that most households at the time could not afford an apartment larger than 50 square meters (Statens Institut för Byggnadsforskning, 1966, p. 7). The Experimenthuset project presented affordable solutions through the efficiency of prefabrication and technical innovations together with the adaptable use of small apartments. The winning architects were Tage and Anders William-Olsson. Their multi-family residential building, a linear block, was built in 1953. The 20 apartments were based on two design ideas with movable wall panels that could provide each unit with different room sizes and numbers of rooms and reduce the overall need of space by incorporating the kitchen into the living room (Statens Institut för Byggnadsforskning, 1966). But the economic incentives were not the only qualities presented with the project. With the adaptable solutions the residents themselves could have the freedom to make arrangements within their own apartments, as the movable wall panels were designed to be handled easily. There was a storage area for extra panels in the basement of the building (Statens Institut för Byggnadsforskning, 1966, p. 9).

There were two surveys to follow up the project, one from 1966 and one from 1988 (Statens Institut för Byggnadsforskning, 1966; Andersson et al., 1988), 13 and 35 years after completion respectively. The surveys show that residents' utilization of the adaptability decreased from the first survey to the second. A cause for this, the authors argue, could be demographic change: there is a low frequency of mobility and in 16 of 20 apartments the residents are now 50–80 years old (Andersson et al., 1988, pp. 62–63). The adaptability, they conclude, was most frequently used when the households consisted of families with children needing more space as the children grew up. As this fraction of households decreased and many households aged, they no longer needed to do adapt their apartment to changing spatial needs. The adaptability of the apartments has been perceived as positive, but by the second survey interest in the feature had declined.

Both reports note that resident turnover at Experimenthuset is low compared to the average rate for multi-family residential buildings. In the second survey (Andersson et al., 1988), the authors discuss whether this might be a result of the adaptability, as households had the potential to modify their apartments instead of moving. They also discuss the positive qualities of the neighborhood, with its strong social relations, as an incentive for wanting to stay in the area, and suggest that stable and socially qualitative communities may be a possible result of the adaptable apartments (Andersson et al., 1988, pp. 37–46). Experimenthuset is one of three multi-family residential buildings in the interview study I conducted for this thesis (4.1).

The debate that followed Experimenthuset had a polemic undertone and was very much focused on the contrast between effective standardization and a freely disposable floor plan that could empower residents (Statens Institut för Byggnadsforskning, 1972, p. 31). Some argued that the housing construction industry needed to find new, more effective solutions if were to resolve the shortage of affordable housing, and because the conventional designs of the day could accommodate people's living habits, there was not sufficient reason to invest in adaptable solutions (Holm, 1955b, pp. 273–274). In response, Tage William-Olsson, the architect of Experimenthuset, emphasized that "Average Joe" is an abstraction who does not exist and that accommodating variability in the rhythm of residents' lives and their changing health was critical. He argued that it was normal for even the average family to encounter frequent issues that called for alternative room dispositions, including the common situation of children growing older and needing a room of their own before they leave the home as adults. He further emphasized the

uncertainty of future living needs, the fact that living habits are continuously developing, and the need for a diverse housing stock that is resilient enough to accommodate this situation (William-Olsson, 1955, p. 293).

2.2.2 *Reactions to mass-produced housing and resident empowerment*

After Experimenthuset, several more years would pass before other adaptable projects appeared. The Kallebäck Deck Building (Däckshuset) in Gothenburg from 1960 by the architect Erik Friberger offered a several levels of structural concrete slabs on which single-family homes could be built (Schneider & Till, 2007, p. 72). Friberger had been developing rational prefabricated building systems for some time, and this project was yet another among many (Dahlbäck, 1971). The adaptable design is a linear block with free-span concrete slabs that allowed individual homes to be built on defined plots, each with its own access points for plumbing and electrical connections. The idea was that a household should have the freedom to build and adjust the dwelling for its own needs and to utilize qualities from both multi-family apartment buildings and single-family homes. The Deck Building can be seen as part of both the second and third drivers of adaptable housing, focusing on technical solutions and prefabrication but also on resident participation in the project. The project reflects similar ideas that Dutch architect John Habraken presents with his book *Supports* (1972). He emphasizes the issues of user participation and how to solve an adaptable housing design, and claims that the resident had to be reintroduced as an actor into the building process to restore the natural relationship between user and dwelling (Eldonk & Fassbinder, 1990, p. 53). Habraken's design idea builds upon free-standing concrete slabs (supports) that provide plots on which residents can build their own homes.

Habraken's *Supports* can be seen as part of the 1960s reaction to mass housing. In many places in Europe, large-scale housing projects provoked a new interest in adaptable housing, and the issue now came to focus on the social qualities of the home. The mass-produced apartments were criticized for implementing a too general, strict and static living frame. This was a step forward for the issue of user involvement. Housing design practice in Sweden, and the debate over the Million Program in particular, were influenced by European developments.

2.2.3 *Another adaptable housing project: Västra Orminge*

One example of adaptable housing from this time is Västra Orminge. The project was a joint venture between the town of Boo, outside of Stockholm,

and the public-interest developer HSB (the National Federation of Tenants' Savings and Building Societies). It was designed by Curman Architects and constructed by Ohlsson & Skarne (Stenberg, 2013, p. 31). The Västra Orminge project consists of 2600 apartments, including both owner-occupied and rental apartments, built in 1964–71 (Stenberg, 2013, p. 31). The project is jointly developed by architects and engineers to optimize its technical and economic solutions (Gillberg, 1971, p. 7). Adaptability was not a goal from the start, but rather a consequence of the extensively prefabricated construction system (Nilsson & Åhlund, 1974, p. 35). The project can thus be seen as part of the second driver of adaptable housing, with technical solutions directing many of the design solutions (Nilsson & Åhlund, 1974, pp. 7–10).

The buildings mostly low-rise lengths and point blocks made with prefabricated concrete slabs and wall elements. The apartments have adaptable space defined by the placement of windows and load-bearing columns, and kitchens and bathrooms are placed next to shared mechanical service chases. The interior partitions are movable wall panels and can be relocated by the resident to adapt the apartment to changing spatial needs (Nilsson & Åhlund, 1974, pp. 7–10). Figure 7 shows examples of apartment floor plans.

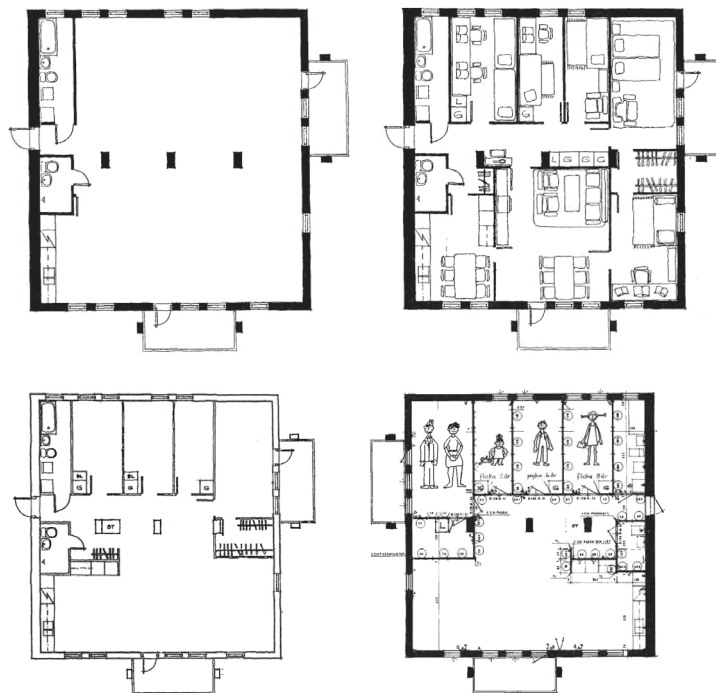


FIGURE 7 The Orminge project. Ten households had the opportunity to plan their apartments themselves, within the production limits, this many times resulted in open plan solutions (Curman & Gillberg, 1969, p. 32).

A survey was conducted three to four years after the building's completion to follow up the project, *Adaptable Housing Västra Orminge, Nacka* (Anpassbara bostäder Västra Orminge, Nacka, Nilsson & Åhlund, 1974). The survey does not cover aspects such as spatial use over time for a growing or contracting household or the qualities of the surrounding neighborhood. Instead it focuses on the apartments' design and adaptability, and quantifies how frequently that adaptability has been utilized. 18% of the households in condominium apartments and 5.5% of those in rental apartments have used the wall adaptability (Nilsson & Åhlund, 1974, pp. 9–13). The employment of adaptability is presented separately for each of the different apartment layouts; in one type as many as 40% of the floor plans diverge from the general design. This is believed to be a clear argument in favor of adaptable apartments. From the interviews in the survey, most of the households are positive toward adaptable apartments (Nilsson & Åhlund, 1974, pp. 9–13). From the residents' perspective, the critical values of the adaptable solutions are the apartment's capacity to provide more rooms as the household grows and also the residents' empowerment to shape their own dwelling situation.

2.2.4 Apartments that accommodate diverse housing needs, a sustainable housing stock, and the life course process

During the late 1960s and 70s the discussion of adaptable housing came to a peak. I will now review some of the publications from this time and some of the issues they addressed.

In 1967, the National Housing Board (Bostadsstyrelsen) was tasked with developing model floor plans that could be used as guides for housing production (Bostadsstyrelsen, 1976, p. 3). The focus was on industrialized construction, and at the same time room functions, circulation, and equipment in the apartment were to be considered. The model plans were also to reflect experiences from current research. In conjunction with this project the submission for comment of *Good home* (God bostad, Bostadsstyrelsen) from 1970, makes an attempt to capture the views of its stakeholders on housing qualities. The publication presents a comprehensive review of what is seen as the apartment's spatial qualities and how the apartment space can be structured to accomplish qualitative goals. It refers to the qualities of adaptability on many levels. One is the sustainability of the housing stock and the future short- and long-term planning of sustainable apartments, where the challenge of volatile household demography can be addressed by a diverse production of apartments for different household types, but also

by adaptable apartments with the capacity to grow or contract in number of rooms (Bostadsstyrelsen, 1970, pp. 1:1–1:10). Good home also emphasizes the importance of considering all types of households, not only the nuclear family, for any given apartment design, and the potential for residents to adapt their apartments to varying degrees of privacy through adaptable space. Finally, the booklet calls for giving residents power to decide on, design, and change their own apartments (Bostadsstyrelsen, 1970, p.1:10).

Some of the comments from stakeholders (such as SABO, HSB, the National Board of Physical Planning and Building) recorded in Good home suggested that the smaller areas made possible through adaptability could lower the apartment standard due to crowding (Hed tjärn & Olsson, 1971, pp. 4–5). With the goal of providing economically viable solutions, the apartment should be highly functional but not larger than necessary. This meant that an adaptable apartment that could be divided to make additional rooms within the same area needed to be over-dimensioned in the first place so the rooms in the adapted configuration would not be too small, and that meant increased housing costs.

The authors of Good home responded to this problem in an article in the journal *Arkitektur* (Hed tjärn & Olsson, 1971) in which they pointed out that the apartment's efficiency of space and its adaptability need to be addressed as a single issue because they are intimately linked. They also emphasize that each household should have the authority to determine how its own apartment is used. An efficiently disposed apartment that enables space to be redistributed to provide additional room(s) for sleeping, they find, can fully satisfy the housing standard and at the same time be viable in terms of efficiency of space. They find the current definition of overcrowding based on the number of rooms in the apartment to be misleading; instead, the apartment's floor area offers an important factor for understanding its capacity to house large or small households. The adaptable solution, they explain, can maximize the use of apartment space because the number and size of rooms can be arranged to fit the household's needs within a set perimeter, while the static apartment with a set spatial structure cannot be adapted to best fit the household's spatial needs—which can often lead to wasted space.

Hed tjärn and Olsson (1971) further conclude that the situation in which the household is crowded by number of rooms can be considered more severe than if it is crowded by area, since every room in the apartment might need to be used for sleeping at some point. This, they find, tends to be the case with overcrowding in the type of static apartments currently being

planned. They see economy of space and adaptability as intimately linked, since a small household can have a spacious apartment on the same area needed for a household with one or two persons to have a more economical design solution with more rooms. They conclude that adaptable apartment solutions do not contribute to increased costs to any great extent and, when used efficiently, can offer uncrowded living at a viable cost.

In 1975, the National Institute for Building Research (Statens Institut för Byggnadsforskning) published a report called *Adaptable housing: applications and consequences* (Anpassbara bostäder, tillämpningar och konsekvenser; Wiktorin, 1975). The report provides an overview of the consequences of more widespread production of adaptable apartments in order to illuminate the possible effects on consumption in the housing market. The report relates to the issue of adaptability from developer as well as resident perspectives and is in part focused on the future, which makes the discussion partly speculative. For the developer the most likely adaptable solution in the future is presumed to be the elasticity solution, as this form allows the apartments to be refurbished, resized, or modernized. Form of tenure is also thought to affect the willingness on the part of the developer or property manager to involve adaptability, and it is more likely to be found in owner-occupied than in rental units (Wiktorin, 1975, Summary).

In the Adaptable housing report, residents' needs of adaptable solutions are related to studies of adaptable housing projects. These studies conclude that most of the adaptations that have been made are due to the households expanding or contracting. Most common is that the households want another bedroom when they have another child or as the children grow and need rooms of their own. One consequence the report identifies of more widespread production of adaptable apartments is a reduction in turnover in the housing market, since adaptability makes it possible for residents to stay longer in the same apartment (Wiktorin, 1975, Summary).

In 1976, the last edition of *Good home* was published (Bostadsstyrelsen, 1976). It describes and illustrates the design of qualitative apartments and also identifies a way forward for adaptable housing. It is likely that its conclusions on the issue of adaptable apartments are based on the previous edition from 1970 (Bostadsstyrelsen, 1970), the Adaptable housing report of 1975 from the National Institute for Building Research (Wiktorin, 1975), the ongoing debate, and perhaps other experiences as well. The focus for adaptability in the 1976 edition of *Good home* is apartments that are adaptable in terms of the number of rooms and room sizes:

The apartments are adjustable in terms of the number and sizes of rooms. The normative floor plan can be altered to create either more bedrooms or larger bedrooms (Figure 8). To do this, area is taken from the kitchen or living room. In order to achieve a certain base quality in terms of adaptability, precise demands have been formulated that require at least one alternate floor plan of this type (per apartment). Adaptability can also be generally exploited to create more spaciousness by reducing the number of rooms or changing the connections between rooms. The normative floor plan forms the bases for public financing ... (Bostadsstyrelsen, 1976, p. 4)

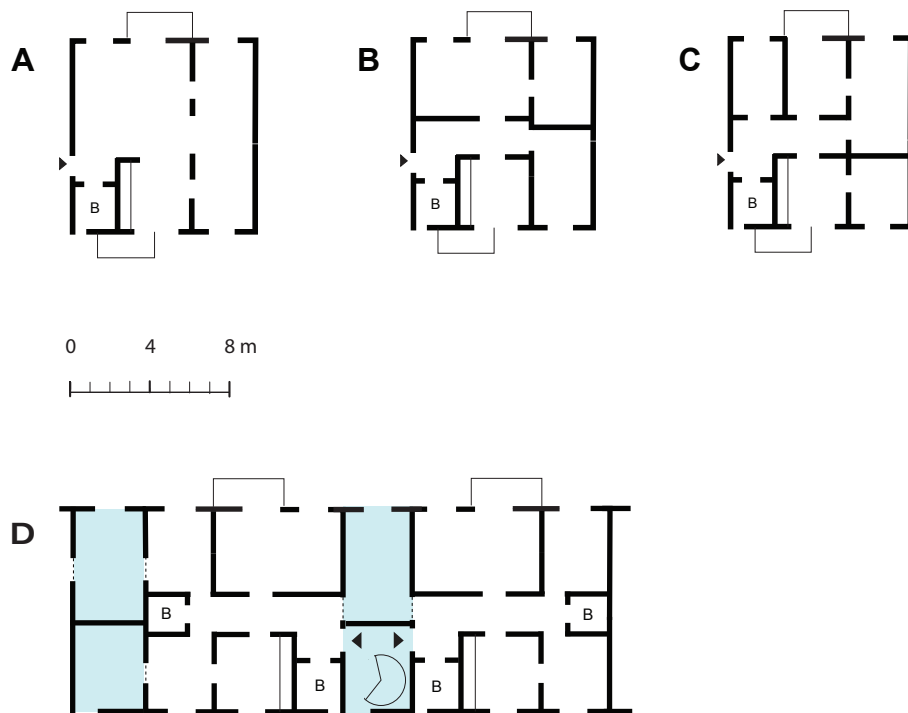


FIGURE. 8 Floor plan qualities presented in Good Home 1976. The floor plans illustrate a flexible design that enable to create additional room(s) in the apartments (Bostadsstyrelsen, 1976).

A: Base structure. B: Two-bedroom apartment. C: One additional room can be created. D: The floor plan configuration admits to regulate the apartment sizes (blue: the room can belong to one of the adjacent apartments).

Adaptability appears to have become firmly established as a recognized quality in housing design in this last edition of *Good home*. Some years later, in the 1982 report *Housing: use and design* (Bostaden: användning och utformning, Gaunt), the topic of adaptability is still seen as relevant. The report summarizes research from a huge study of living conditions. Adaptability is here promoted as a critical quality to enable more diverse use of multi-family residential buildings in the future, but also a way for an individual household to respond to the family's changing needs for space as the children grow up and move away from home. The ability to make small changes to the apartment space, such as dividing one of the existing rooms to provide an extra bedroom during a time when the family is growing, is described as a reasonable and justifiable adaptable solution (p. 74), and the issue of enabling the household to stay in the same apartment as it grows is emphasized:

Small households become larger with the addition of children, only to become smaller again when the children move out. If the household is to remain in the same home throughout this time, they ought to be able to change it according to the changing conditions of the household (p. 73).

However, the report notes, we should not aim for adaptability at any cost. The standard two-person household, for example, cannot have the same size apartment as a four- or five-person household; thus major changes in the household cannot be solved with adaptability. In the case of major changes, the household must seek a new apartment, and as long as there are suitable apartments available in the area they can stay in the same neighborhood. But small changes in the household can be accommodated through adaptability, such as dividing a large room in two (p. 74–75). In the report *Housing: use and design* adaptable solutions that enable small spatial arrangements such as creating one additional room as adequate design solutions are emphasized. Dividing one bedroom into two smaller ones can create two teenager rooms, separate bedrooms for the parents, or a room for an elderly relative. This solution also provide for the single-parent household to have several small rooms instead of a two-person parents' bedroom (p. 74–75).

After the publication of the 1982 report, the issue of adaptable housing in norms, standards, and debate, and the prevalence of adaptability in realized housing projects, became increasingly rare—until today, when a slight increase in interest can be discerned. The reason for the declining interest

in adaptability since the mid 1980s is not clear. Contributing factors may include the end of government involvement in the development of housing, the depoliticization of the housing issue, and the gradual phasing out of subsidies (Nylander, 2013, p. 229) as housing has become a market commodity.

2.2.5 Recent developments

In more recent times, adaptable housing cannot be seen as a common phenomenon in the European context, but an increased interest can be detected. Eldonk and Fassbinder (1990) describe an increased interest in adaptable housing during the 1990s in the Netherlands as a consequence of extremely dynamic changes in households, with increasing diversity in types of households leading to various forms of shared accommodation (Eldonk and Fassbinder, 1990, pp. 65–75). The household's life-course changes also constitute a central topic for housing research and design (Eldonk and Fassbinder, 1990, p. 65–75). In her article "Life transforms living transforms life" (2006) Sigrid Loch also emphasizes that recent housing innovations in German-speaking countries offer solutions with openness, adaptability, and individually interpretable spaces as an answer to the transition to an information society, the diversity and inconsistency of households, and the dynamics of life. This implies an increased interest in adaptable apartment solutions as a realistic alternative to meet current and future changes in housing needs.

Many of the projects that have been realized in recent times outside of Sweden are linked to the third driver of adaptability in housing, user participation. One example is the Pelgromhof project (1998/2001) designed by Dutch architect Frans van der Werf. The project consists of open-plan apartments that allow residents to configure their dwelling space according to their own ideas and preferences (Schneider & Till, 2007, p. 115). Another project, the Überbauung Hellmutstrasse in Zurich (1991) by ADP Architecture and Planning, was developed in consultation with future tenants who belonged to a housing cooperative committed to the idea of a form of communal living in an urban neighborhood. The building forms an elastic structure in which apartment space can be reallocated between adjacent units, enabling diverse sizes of apartments (Schneider & Till, 2007, p. 105).

There are also projects focusing on the social aspects of adaptable housing, using the idea of user participation to establish a sense of agency, identification, and engagement in one's own home as well as providing adaptable space. The French architects Lacaton and Vassal work with raw space

in housing projects, combining large living areas with rational materials and construction methods to cut costs. The adaptable factor in their work, they claim, is the large space for living (Gromark, 2007, pp. 26–27). One example is their contribution to the project *La Cité Manifeste* in Mulhouse (2005), where raw space (an unfinished shell) and industrial construction methods have contributed to providing affordable and adaptable housing. In Iquique, Chile, Elemental Architects have worked with social sustainability dimensions, designing a new housing area for a whole neighborhood in the Quinta Monroy development (2004). They have worked with user participation as a precondition (Groundwater, 2018). The Tila housing development by Talli Oy Architects in Helsinki, Finland (2011) is another recently produced adaptable housing project that combines raw space with user participation (Tila Housing, Helsinki, 2011).

In Sweden, the *Bo 100* project in Malmö (1990), designed by Iwo Waldhör and developed by MKB (the local municipal housing company), is a housing project with 39 rental apartments whose floor plans were developed with user participation during the planning phase. The future residents designed their own apartments in close collaboration with the architects. This has resulted in 39 diverse apartment floor plans, each one unique (Waldhör, 1991; Hultin, 1991). A more recent project that also engaged the residents in planning their own apartments is *Urban houses (Urbana villor)* in Malmö (2008), a “group-build housing development” project led by architects Siegel and Åqvist. The benefits emphasized in this project are the residents’ own planning contribution and the realization of some of the qualities of single-family homes in a multi-family residential building (Siegel & Åqvist, 2008; Sommar, 2008). Today there is increasing interest in adaptable housing, and one reason may be the current huge housing shortage, which calls for new ideas for apartment design and housing construction.

At the 2017 Vallastaden housing expo in Linköping there were several small and large housing projects that focused on the diversity of households and diverse and adaptable apartment solutions. These projects tie back to the first and third drivers for adaptable housing—small, efficient apartments that can provide affordability and user participation focusing on residents’ needs and comfort. Two examples from the expo are the *Dream Apartment (Drömlägenheten)* and the *iValla* project. The *Dream Apartment* is a single apartment that can be rearranged in a variety of configurations from studio to four-bedroom apartment (during the expo it occupied the entrance level of a multi-family residential building). The project was developed by,

Stångåstaden, the municipal housing company in Linköping, together with White Architects. The brief for the design concept is a household of two adults one week and an additional three children the next. The design, which allows for a compact apartment solution, includes folding walls, beds coming from the ceiling, and storage spaces under the floor (White, 2018). The other project, the iValla project, was developed by Urban Properties together with Omniplan Architects. iValla is a condominium with twenty adaptable apartments. The interior partitions are movable, and all mechanical services are incorporated within the floor, which facilitates a free disposition of rooms, including bathroom and kitchen. Chases and staircases are strategically placed to allow adaptability (Lindström, 2017).

The final project I will review is not yet completed: the Viva in Gothenburg developed by Riksbyggen EF together with Malmström and Edström Architects. The project is a condominium and consists of 132 apartments. The larger apartments are adaptable with a compact design. The walls can be repositioned later to provide adaptability in room sizes and number of rooms. The compact apartment space allows for common facilities in the multi-family residential building as a whole, for example a greenhouse and a guest apartment (Riksbyggen, 2018). I worked on the Viva project as part of the thesis, and it is described in 1.1.4, and in the licentiate thesis (Braide Eriksson, 2016, pp. 65–78).

In reflecting on the development of adaptable housing in Sweden through the years, knowledge of the topic from research and from model floor plan can be regarded as comprehensive, but the experience and follow-up of completed adaptable housing projects is poor. What direction the issue of adaptable housing will take in future housing production is unclear despite its recent reawakening, but evidently many of the issues reviewed here remain relevant today, such as demographic transformation, the need for apartments to provide broad spatial utility for diverse households and living situations, and the need for a sustainable housing stock.

2.3 CURRENT APARTMENT DESIGN AND SPATIAL USE OVER TIME

Above I have reviewed the development of adaptability in the current practice of apartment design. Having understood some of the preconditions for design and their relation to the issue of adaptable space, there is still one missing factor that completes the picture of adaptable apartment design today: mobility. As a household's spatial needs change over time, expanding and contracting,

there is an expectation that the household will relocate. They do not always exercise this mobility. Next I will review some bottom-up perspectives that overrule the ideas behind today's housing, including the mobility issue, and finally I will conclude this chapter by offering some reflections on current apartment design and the issue of spatial use over time.

2.3.1 Apartment design today: a “mobility with changed spatial needs” concept

Today's apartment design practice is based on a particular concept of what makes a qualitative home, but also on the mobility of households. The norms we have today are based on the apartment as a spatial structure of rooms with specified functions for sleeping, eating, hygiene, and social gatherings, as described in Chapter 1 (Boverket, 2015, pp. 37–66; Swedish Standards Institute, 2006a; Swedish Standards Institute, 2006b). The apartment's fixed size and the conception of rooms as static entities mean that apartment floor plans are tailored to fit fairly specific housing requests. When the household's spatial needs change, this suit might become too tight or too loose, whereupon the household is expected to move to another apartment. The apartment is thereby conceived as one of many housing units that together are meant to serve the household's housing needs over sequences of time by supplying diverse spatial sizes and qualities. The chain mobility thus begun is commonly referred to as a mobility process. Over the course of the household's “housing career,” the sustainable housing stock is meant to provide enough apartments of the right size and right geographical location to meet the household's spatial needs.

Mobility in the housing market also constitutes an important factor from a labor market perspective: the mobility of households can influence the mobility of the workforce as a whole, and thus impact market growth (Statens bostadskreditnämnd, 2008). Workforce mobility distributes the supply of relevant labor geographically to allow matching between jobs and workers, which is critical for economic growth (Borgegård, 1989, p. 69; WSP, 2016, p. 9). The severe housing shortage characterizing the housing market today (Boverket 2012) acts as a restraint on workforce mobility.

The situation with housing shortage is not new: Sweden suffered through a shortage of housing for much of the 20th century, with the exception of some years in the 1960s and 70s, when the Million Program created a housing surplus (Boverket, 2004; Dalén & Holm, 1965; SOU, 1965). This shortage has often made it difficult for households to find a suitable apart-

ment (Dalén & Holm, 1965). Recent research on mobility in Sweden finds that relocation is limited by a short supply in the rental market and by the high transaction costs of waiting lists in the renter's market and taxes in the owner's market (WSP, 2016, p. 9). Studies have also concluded that today's mobility processes have limited local efficiency in the housing market, meaning that groups of households not are helped in finding proper residential alternatives by other households' relocation (WSP, 2016, p. 9).

2.3.2 *Mobility overruled*

The life course factor described in 1.3.1 has been established and discussed in the context of household mobility. The idea that households respond to changes in their housing needs generated by life course changes by moving is widely accepted today (Coulter & van Ham, 2013; Clark & Huang, 2003; McHugh, 1984; McLeod & Ellis, 1982; Rossi, 1955), but other research also shows that the issue of mobility is more complex. Mobility can be restrained, to a greater or lesser extent, by a range of political, economic, and social conditions (Lundholm, Garvill, Malmberg, Westin, 2004, p. 59). Environmental and social factors are found to exert an important influence on decisions to move or not move (Lundholm et al., 2004, p. 59), and life course changes and the related social dimensions are identified as influencing factors in this context.

Settled people (people who stay a long time in the same apartment) are found to be more strongly committed to their jobs, household members, and established social networks, while the lack of such commitments makes mobility more feasible at a younger age (Fischer & Malmberg, 2001, pp. 358, 368). Having children, owning a house, being married, and being employed are conditions that constrain mobility. This means that the distribution of such commitments over periods of working, family life, home ownership, and so on, strongly affects the distribution of mobility over the different life courses (Fischer & Malmberg, 2001, p. 368). Research also shows that people who have lived longer in the same region are less prone to move. The decreasing rate of migration over the life course results from the increasing value of staying in the same place of residence and is determined by accumulated location-specific insider advantages that include strong social ties, commitments to local projects, knowledge about local conditions, and other forms of attachment to the region or location of housing (Fischer & Malmberg, 2001, p. 358).

Results in my licentiate thesis (Braide Eriksson, 2016) also pointed in this direction. For households with children, social dimensions linked

to everyday life in the neighborhood as well as continuity in schools were relevant factors for the decision to stay and not move to another area.

In addition to this, there are households that, rather than moving in response to dissatisfaction with their homes, renovate or remodel them to better satisfy their needs—the so-called non-mover-renovators (Baum & Hassan, 1999, p. 23). Some of these households have been living in one place for a substantial period of time, and the strength of social networks and familiarity with the neighborhood may undercut the desire to move. For these households, therefore, renovations may be a reasonable alternative (Baum & Hassan, 1999, p. 33). Still other households plan for renovation from the time of purchase (Baum & Hassan, 1999, p. 33). This non-mover-renovator perspective challenges the assumption that the most likely response is to move.

All together, the factors involved in the issue of household mobility are several and complex. When a household's life course conditions change, one response is certainly to move to a different apartment, but the decision to stay and solve the changed spatial need in place is an important alternative. The family life course, the time in life when children are growing up, can bring profound changes in spatial needs—perhaps requiring another room, for example. But this can also be a time when a more settled living situation is preferred and even highly valued, as continuity with schools and everyday social life can greatly enhance the quality of life. This perspective makes the adaptable apartment space an interesting alternative that can provide some solutions to solve the household's spatial needs.

2.3.3 Reflections and theoretical approach

The current practice of apartment design relies on the construction of close-fitting and space-efficient plans, the household's mobility, and access to housing alternatives in the right geographical locations to allow the household to expand or contract. This approach does not work well considering the housing shortage and the limited supply of apartments in the market today (Boverket 2012).

This thesis examines the potential for adaptable housing to address the changing spatial needs of a household, and the family life course situation in particular, as an alternative to simply moving. The issue of spatial use over time and the decision to move could become matters of personal choice if adaptable space can resolve the household's changing spatial needs. This perspective is not new; it has been asserted several times before as a critical

precondition for the apartment's spatial use, as presented in 2.2.4. Today's apartment design can be seen as having a top-down perspective in which the design dictates how to live and when to move. Adaptability, on the other hand, can offer a more bottom-up approach in which the household can shape its living situation based on its own preferences, exert greater control over its own mobility, and perhaps reap the benefits of established and ongoing everyday social dimensions.

The theoretical approach for the thesis is determined out from the close focus applied, on the empirical situations and the households' living processes, and from the orientation of the research questions. The focus for the thesis is the household's spatial use and living process, the social aspects related, and the relevance of adaptable apartment space, and the concern is to identify social and spatial mechanisms, and spatial qualities. The focus is thereby closely related to the qualities found in the empirical studies, and the thesis is thus framed by a theoretical approach similar to what Merton (1949) calls *Middle range theory* (MRT). Theories of the middle range are theories that lie between the minor but necessary working hypotheses that evolve during day-to-day research, and the all-inclusive systematic efforts to develop a unified theory that will explain the observations made (Merton, 1949, p. 39).

These are theories that within the field of sociology deal with delimited aspects of social phenomena, for example theory of reference groups, or theory of social mobility, and they are within sociology used to guide empirical inquiry (Merton, 1949, p. 39). As the theories are developed wholly in terms of the elements of social structure, rather than relating to particular all-inclusive theories, they can transcend the problem of a theoretical conflict between the general and the altogether particular. There can be a risk to entirely concentrate on ranges of special theories and not refer to all-inclusive theories, as the hypotheses can account for limited aspects of the issues studied that can be inconsistent. At the same time, to develop theories of the middle range can contribute to consolidate groups of special theories, which in turn can contribute to new theories, that can be consolidated into more general sets of concepts and mutually consistent propositions (Merton, 1949, pp. 43–47).

In this research, the concept of adaptable space and the overarching concepts of social sustainability (Murphy, 2012), provide a framework for understanding spatial and social issues. The three strategies for adaptable space, generality, flexibility and elasticity, frame spatial qualities (1.3.2), and Murphy's framework for social sustainability, with four social dimensions,

social cohesion, participation, equity, and awareness of sustainability, forms a frame for the social qualities studied (1.4) (Murphy, 2012) (Braide Eriksen, 2016, pp. 27–30).

To understand the issue of time, the household's living process with spatial use and social aspects related, Merton's concept *Socially expected durations* (SED) is used (Merton, 1984). The SED concept deals with socially prescribed or collectively patterned expectations about temporal durations imbedded in social structures of various kind (Merton, 1984, pp. 265–266). This concept, I can see, can be used to explore and understand both social and spatial expectations, and can thereby be used to understand the living process as conceived in the current dwelling design, where the household is expected to move when their spatial needs changes.

When reflecting the current dwelling design, how apartment design is conceived of, and relate to the norm III for crowding, a set expectation for how social and spatial durations shall develop, is revealed. The current construction of the supply of dwelling space with close-fitting and space-efficient apartments, and the household's expected mobility can be seen as a socio-spatial expected duration, manifested in realized physical dwelling structures. The studio apartment is expected to house a single household with rather specified use of the apartment, the one-bedroom apartment is expected to house a couple, or a single person household with the same premises. The two-bedroom apartment can house the small nuclear family, parents and one child, or one couple and another adult, -and so forth. The spatial duration is here decided out from the apartment's spatial capacity to house the household, meanwhile the social duration appears be a qualitative dwelling situation for a limited amount of time. There is an expected social and spatial duration inscribed in the actual design of the apartment, this construction of duration and the social and spatial qualities it involves can be evaluated with the findings in the research.

The presented concepts and strategies for adaptable space: the family life course with the household's expanding and contracting (1.3.1), the time-space model (1.4), and the three adaptability strategies (1.3.2), together with Murphy's frame work (1.4), and Merton's SED concept, form the theoretical frame work for this thesis.

3 METHODOLOGY

This chapter outlines the thesis research approach, it describes the research design, the methods applied, the data collection and analysis performed. And it concludes with an assessment of the validity, reliability, and ethical considerations for the conducted research. The chapter incorporates the research design and methods developed for my licentiate thesis (Braide Eriksson, 2016), presenting the whole research strategy as one process.

3.1 RESEARCH APPROACH AND RESEARCH DESIGN

This thesis is based on the understanding of architectural research as described by Groat & Wang (2013), conceiving the architectural research field as involving questions of both technical, aesthetic, and social character and comprising research holding both the qualitative and the quantitative paradigm (Groat & Wang 2013, pp. 63–80). Adopting one of these systems of inquiry (the qualitative or quantitative) does not automatically determine either the strategy or the tactics for the study performed (Groat & Wang, 2013, p. 74); instead, a variety of both strategies and tactics can be used in ways consistent with the chosen paradigm (Groat & Wang, 2013, p. 74).

Since the research questions in this thesis focus on the spatial design of the home, its adaptability, how it is used over time, and some of the social dimensions that can be correlated to these, qualitative methods are more suitable compared to quantitative. The focus implies complex situations: the living process in which the household, its situation, its use of space, and the spatial design of the home are all variables, and in which knowledge of the evolving social context is limited. To delimit these complex situations and processes, which are evolving over time, qualitative research is used with empirical studies of living situations in the home. The epistemological position is understood from a subjective-qualitative paradigm, as described by Groat & Wang (2013, pp. 73–77), in which the world is known through sociocultural engagement. Ontologically this thesis presumes that although there are multiple different viewpoints concerning sociocultural realities, it is still possible to achieve shared understandings of those realities (Groat & Wang 2013, pp. 67–78). The object studied, the household and its spatial use in the everyday setting of the home, provides the basis for choosing a research

design that can do justice to the diversity and complexity of everyday life (Flick, 2014, p. 15–16). The design thus involves three studies comprising a mix of methods, two empirical studies of living situations with households in their homes, and one research by design component. The three studies, (1) Social dimensions, (2) Research by design, and (3) Living processes, all refer to the issue of how space is used in the home.⁴ The three studies have been followed up with the theoretical frame work, and the research has been conducted as an iterative process employing inductive reasoning. The frequently evolving questions and reflections have affected the next move in the research, and thus the different research issues have been developed separately, in parallel, and in triangulation (Yin, 2013, pp. 86–87; Denzin, 2012) both in the data collection and as an analysis strategy (Figure 9).

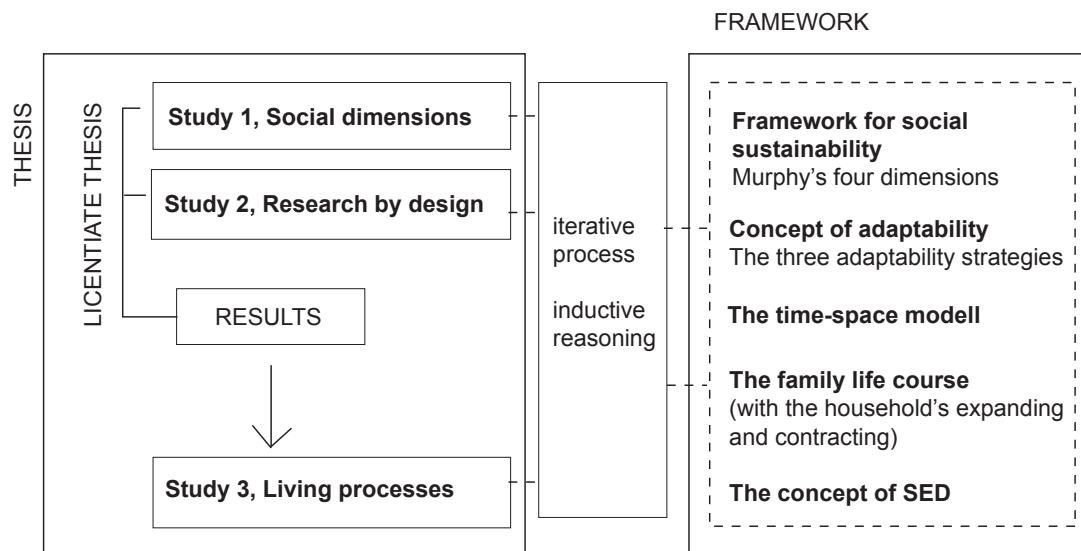


FIGURE 9 Diagram showing the research design.

4 Studies 1 and 2 were titled in my licentiate thesis Empirical study of social dimensions of residential space and Research by design: a design strategy (Braide Eriksson, 2016, pp. 31–38). They are here renamed and slightly reformulated to compose the description of the total research process with the three studies.

The roots of the questions addressed in this thesis can be found both in my own prior experience as a practicing architect working with housing design, and in my experience of two separate surveys of apartment design that I performed together with my colleague Ola Nylander (Nylander & Eriksson, 2009; Nylander & Braide Eriksson, 2011), as I recounted in the introduction. These experiences awakened my curiosity on the issues of apartment adaptability, spatial use, and household typologies. Later these living situations became the natural starting point for this thesis. The original impetus for the thesis was to deepen our knowledge of social sustainability from the perspective of apartment design, and the disconnect I found between apartment design practice and the strength of adaptable spatial solutions seemed to be an interesting departure for the work.

As the questions I bring with me originate from a “designer’s perspective,” it is critical that the research can return constructive ideas to the design practice, therefore one objective for the thesis is to focus in parallel on both theory and design. The thesis thus starts with one empirical study, Study 1: Social dimensions, and one design-focused study, Study 2: Research by design. The two studies are conducted in parallel to theoretical reflections for the social sustainability aspects involved. The empirical study is aimed to gain knowledge of the relation between spatial use, adaptable space, and social dimensions in the living situation, and the design-focused study is aimed to broaden the understanding of apartment adaptability and social sustainability dimensions in the design work with apartment floor plans and possibly also find strategies for the design work in this sense. Study 1 and Study 2 together formed my licentiate thesis (Braide Eriksson, 2016).

I built on the results of these two studies to form the next study, Study 3, Living processes. In this study the relevance of adaptable space for the household’s living process is surveyed together with social dimensions correlated to neighborhood qualities (Braide Eriksson, 2016, pp. 79–82). Another result further developed for Study 3 is the time-space model, the aforementioned strategy (1.4) involving a way to interpret and make visible the household’s living process and spatial use in the home over time (Braide Eriksson, 2016, pp. 79–82). The focus for the third study becomes the household’s living process with related spatial requirements. This study delves deeper into the issue of adaptable apartment space to understand how the household conceives of spatial use in the apartment over a sequence of time and in what way the apartment’s adaptable space can response to this process. The

time-space model is used to analyze and narrate the living processes found in the empirical study conducted in Study 3. The Swedish context of housing research and experiences of adaptable housing projects, both theoretical and realized, forms the framework for Study 3 and provides a critical source for understanding the attitude toward and the extent of knowledge about adaptable housing in Sweden.

3.2 THE THREE STUDIES: THE USE OF SPACE IN THE HOME

The three studies all explore the use of space in the home, but adopt diverse focuses. Each study is presented below with the research questions and associated methods featuring the related research design together with the data collected and analyses performed.

3.2.1 *Study 1: Social dimensions*

Study 1 aims to understand how current apartment design can respond to diverse living situations and housing needs. The focus is to investigate correlations among the use of space in the home, the apartment's adaptability, and social sustainability dimensions. It is an empirical study that uses previous collected data from two earlier empirical surveys of living situations (Nylander & Eriksson, 2009; Nylander & Braide Eriksson, 2011).

3.2.1.1 *Research questions and methods*

The research questions explored in Study 1 are:

- *How does the practiced layout of residential floor plans correspond with today's residential requests and needs?*
- *How can residential usability correspond to residential requests and needs, and affect social sustainability dimensions?*

The living situations in the previously performed surveys of living situations (Nylander & Eriksson, 2009; Nylander & Braide Eriksson, 2011), revealed a discrepancy between usage and current design practice, interesting examples of spatial use, and interesting correlations between social dimensions and adaptable apartment space. Three examples are selected from my previous research and reinterpreted in Study 1. The material consists of interviews of households in their homes and furnished floor plans illustrating their living situations and the use of their apartment space. Study 1 has been paralleled

with theoretical work outlining the relevant framework for apartment adaptability and social sustainability dimensions.

3.2.1.2 *Collected data*

Here I present the selection of households made for Study 1 from the two prior surveys of living situations (Nylander & Eriksson, 2009; Nylander & Braide Eriksson, 2011).⁵ These surveys (Nylander & Eriksson, 2009; Nylander & Braide Eriksson, 2011) employ qualitative, semi-structured, in-depth interviews with households in their homes supported by illustrations of furnished floor plans of the apartment. Preparation for these interviews involved planning the interview content, retrieving drawings of floor plans for the selected apartments, contacting and informing the households to secure permission to do the interview, and scheduling the interview sessions. The interviews were conducted with one or two members of the household during only one occasion per household for a duration of approximately one hour. The interviews were performed by two persons, me and my colleague Ola Nylander. Each occasion began with the interview, and afterward the use of the home was documented with preparation of a furnished floor plan and photographs. The residents did not participate in preparation of the floor plans or photographing of their homes. After this the interviews and floor plans were analyzed as described in section 4.2.1.3.

The selection of households for Study 1 was based on their living situations and aimed to satisfy two parameters: first to reflect a diverse use of apartment space in order to understand how the current design of apartment floor plans corresponds with today's requests and needs; and second to measure the capacity for spatial use in the apartment in order to understand how the household's use of space corresponds to its requests and needs, and how it affects social sustainability dimensions. The households are presented in Figure 10.

The decision to study a variety of uses for the space in the home was motivated by a desire to better understand the changes in household constellation that are being driven by today's ongoing demographic transformation. Demographic transformation is increasing the number of different

5 I only briefly describe the data collection methods used in those surveys, as they are not fully employed in this thesis; a fuller description of the tactics and data collection can be found in each survey report (Nylander & Eriksson, 2009; Nylander & Braide Eriksson, 2011). I also describe here the implementation of the interviews for Study 1.

household types (Braide Eriksson, 2016, pp. 18–24), and the indicated mismatch between the demands for living space and the current supply of apartments reflected in 1.1.2 can mean that many household types can have difficulties finding a well functioning home. In this context, the selection of diverse households was intended to provide insight into more diverse housing needs than the current apartment design admits today. I believe this strategy can provide insights that can give us a more holistic understanding of the apartment's spatial use and the capacity of dwelling space to satisfy diverse spatial needs. The diverse households selected in Study 1 are: *the joint-custody household*, *the large family*, and *the single-parent household*, and the apartments all represent units designed for families with children.

The other parameter in selecting households for Study 1, the household's access to needed living space, has meant a focus on crowded living situations. I believe that many times the adaptability of space in the home is not accurately tested until there is a crowded situation. This means that a household living a space that is sufficient to meet their stated needs or even provides some surplus space is not likely to optimize its use of that space, which may mean that some adaptable solutions are available but not utilized. The three living situations selected for the empirical study thus comprise pluralistic households living in crowded situations. The selection process is also described in my licentiate thesis (Braide Eriksson, 2016, p. 34)

	HOUSEHOLD (*)	OCCUPATION	APARTMENT
1	SHARED CUSTODY HOUSEHOLD Shifting size elastic apartment: One person household / four person household every other week : man (36), children (3, 6, 9)	consultant art	elastic apartment studio, 35 m ² one bedroom, 54 m ²
2	LARGE FAMILY HOUSEHOLD Seven person household: woman (36), man (38), children (1, 3, 5, 11, 14)	w: preschool teacher m: industrial co-ordinator	three bedrooms, 79,6 m ²
3	SINGLE PARENT HOUSEHOLD Three person household: woman (36), child (4), tenant (student) (21)	consultant	two bedrooms, 74 m ²
*age, w:woman, m:man			

FIGURE 10 Selected households and apartments for Study 1.

3.2.1.3 *Analysis work*

The analyses of selected data from interviews and floor plan illustrations for the thesis were conducted with a similar strategy for Study 1 and Study 3. The general strategy for analyzing the selected data is influenced by Kathy Charmaz's book *Constructing grounded theory* (2014), in which she looks for interpretive understanding rather than a variable analysis that produces abstract generalizations. An interpretive understanding located in the particularities of time, situation, and space constitutes the aim for the analysis.

The selected data from floor plan illustrations in Studies 1 and 3 are performed using the same method. The work is based on the established, conventional form of analysis practiced by architects in their work designing floor plans. The method can be described as figurative empirics: the floor plan embodies an entrenched, collective knowledge similar to a language. The capacity and use of the apartment can here be understood by "reading" the floor plan qualities. This method constitutes a critical tool in architectural practice. One example of this is Nylander's dissertation, *The architectural properties of the home* (Bostadens arkitektur, 1998), a fundamental part of which is the analysis of floor plans.

Addressing Study 1 more specifically, the focus for the analysis of data selected from the interviews is on the understanding of dimensions of social sustainability aspects and how these correlate to spatial use and adaptable apartment space. In the analyses, the residents' subjective understanding of their living situation has been interpreted through their use of apartment space and their situational needs through aspects of social sustainability. Kevin Murphy's four social dimensions (2012) have composed a framework for the analyses (see 1.4). In each living situation, the interview data and furnished floor plan have been analyzed in parallel in an iterative process employing inductive reasoning. Thus the understanding of the living situations is derived from a co-reading and analysis of the interviews and apartment floor plans.

3.2.2 *Study 2: Research by design*

If Study 1 is an empirical study aimed at the correlations between social dimensions and the apartment's spatial use, Study 2, conducted in parallel, is focused on the design work with apartments, and how the use of the apartment can be understood in the practice of apartment design. The aim here is to find some sort of design tool or strategy for the planner, developer,

or architect to provide adaptable apartment solutions that recognize and enhance the household's social sustainability dimensions in its living situation. The study is developed in the context of the research platform PFH and consists of three components: a research by design component, a full-scale design involvement in the experimental project Viva, and an interview with the developer Riksbyggen EF.

3.2.2.1 Research questions and methods

The research question explored in Study 2 is:

- *How can social sustainability aspects become a salient component in the work with residential floor plan design?*

One objective when starting the thesis was that the research could return constructive ideas to the design practice. The framing of this study allowed me to involve design work to better understand the preconditions for adaptable apartment design on the drafting board. The parallel work on Study 1 allowed an iterative process through which questions about how dwelling space is used (Study 1) and how design can be applied (Study 2) blend and inform one another.

3.2.2.2 The research by design component

The research by design component focused on different ways of working with adaptability in apartment floor plans. The aim was to find a design tool or a design strategy that promotes the inclusion of social sustainability aspects in the design work with apartment floor plans.

The work was performed in conjunction with master of architecture studios I taught over the course of three academic terms focusing on the design of adaptable multi-family residential buildings, and was conducted in close relation to and cooperation with the PFH's work with the Viva development. In the student project work, the site for the Viva building was used to allow for the students' design work to contribute to the PFH group's ongoing discussion on Viva (see 1.2). The assignment for the students' design work was deliberately framed to take a broad perspective, since the possible outcome is difficult to foresee. Thus the design work could be processed as an open-ended discussion, and the outcome could include the discovery of design rules for a flexible optimization of space or general methods to support the design work (Figure 11).

RESEARCH BY DESIGN

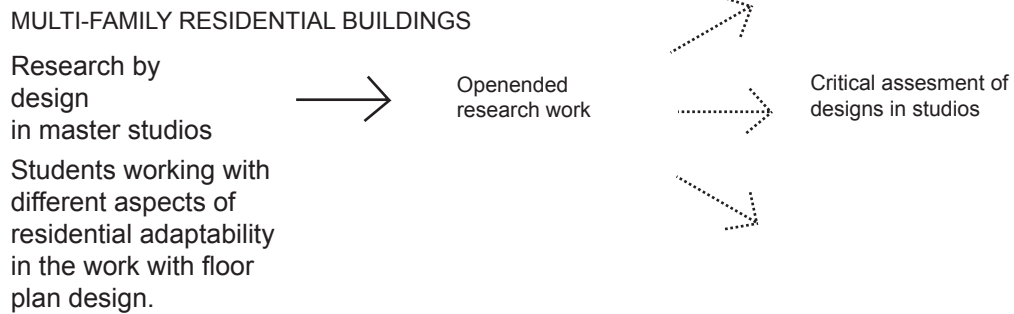


FIGURE 11 The research by design component is realized as an open-ended research work. The question of adaptability and how it relates to social aspects, is inquired through critical assessment and discussions of the design work.

Through their design work with floor plans, the students investigated the intrinsic qualities of adaptable design in relation to diverse household types and living situations. To enable a way to discuss the living spaces' adaptability, the students were asked to present their floor plans as sequences of living situations during a set time span for a defined household. These sequences were presented with the help of a stipulated living process. The work with the floor plans allowed the students to understand the correlations and effects of space and time and discuss the aspects of social sustainability. By writing short narratives about the households' living situation and furnishing the floor plans, the students were able to visualize the spatial capacity of the floor plan design. Over the course of their work, this procedure crystallized into an applicable method that became the time-space model (1.4).

3.2.2.3 *Viva: a full-scale design involvement*

The full-scale design component comprised a dialogue between master studio participants and the PFH group. The dialogue was based on the design solutions students developed for the housing design projects and involved adaptable apartments, but also on other housing designs featuring sustainability issues for the Viva buildings and the life inside them. The dialogue stretched over a period of three years and consisted of recurring meetings, a few workshops in the PFH group, and in recurring master course critique sessions in which representatives from the developer Riksbyggen EF have participated. This dialogue has generated knowledge and helped establish

an attitude toward the issue of adaptable housing design, and possibly contributed to the realization of adaptable apartments in the Viva development.

3.2.2.4 Interview with the developer, Riksbyggen EF

The issue of adaptable apartment design also involves its prospects for realization. The interview component aimed to better understand some of the existing preconditions and priorities that impact apartment adaptability in multi-family residential buildings. The interview was conducted as a qualitative, semi-structured interview with representatives from the developer of the Viva project, the head of marketing and project leader respectively. They were asked to describe what factors affected their decisions about adaptability solutions for the apartments in the Viva project and to summarize their perspective on different decisions on adaptable apartment solutions.

The interview was recorded and conducted by me on the Chalmers University campus. My questions were open-ended and involved, for example, the sizes of the apartments versus their adaptability capacity, the subjects' opinions of user participation, and the market preconditions for adaptable apartments. After the interview, I sent a transcription to the subjects for review and comments, and the revised text eventually formed a part of my licentiate thesis (Braide Eriksson, 2016, pp. 71–77). The interview contributes to the understanding of some of the questions that arise from the perspective of developing and constructing adaptable apartment solutions.

3.2.3 Study 3: Living processes

Study 3 follows on and deepens the results from Studies 1 and 2. The aim was to understand the relevance of adaptable living space in living process situations over an extended time frame, and to understand in what way adaptable apartment solutions can provide qualitative adaptable space and how this correlates to social aspects in the close neighborhood area. Study 3 is an empirical study that takes both a theoretical and a design-directed approach.

3.2.3.1 *Research questions and tactics*

The research questions explored in Study 3 are:

- *How can adaptable apartments support a household's need for living space over a longer time span?*
- *How does this relate to the current apartment design?*

This calls for an understanding of the viability of diverse adaptable design solutions and suggests a second set of related questions:

- *How do households conceive of adaptable apartment space?*
- *What living situations are solved?*
- *How can adaptability be understood spatially?*

Study 3 consists of ten interviews of households in their homes supported by furnished floor plans illustrating their living situation and use of their apartment space. The study was paralleled with a review of the development of the current dwelling design, which allowed for an understanding of current apartment design practice through a historical review of housing research and the experiences of realized adaptable housing projects in Sweden. It describes how apartment design has been developed and practiced, as well as household preferences and actual use of space in the home, through a survey of prior research. This means that the household living situations studied empirically in Study 3 can be understood from the perspective of the accumulated ideas and experiences of adaptable apartment space from the Swedish apartment design context in terms of design intent (the top-down perspective) and the household's actual use of the home (the bottom-up perspective).

As a way to understand the relevance of adaptable apartment space and how it can provide qualitative homes, the study investigates realized examples of adaptable apartment solutions. Throughout the course of the development of apartment design to the present, there have been many studies and much knowledge gained on the subject of apartment adaptability; however, it appears to me that as interest in adaptable apartments waned, much of this knowledge was lost or forgotten. Some of these adaptable solutions are brought back to life in the study and evaluated on the basis of feasibility and spatial capacity.

Study 3's focus on the household's living process makes adaptability a central feature. Here Schneider and Till's approach to the issue of apartment

adaptability, where the apartment needs to respond to the changing constitution of a family as it expands and then contracts (2007, p. 41) (see 1.3.1), offers a clear and framed concept of the living process and the question of how space is used. In Study 3, the situation of expanding and contracting spatial needs is focused on the family life course situation for households expecting or raising children. This household type is an interesting target for the study because its spatial use over time can mean comprehensive changes and because the type is so common—in 2017, 37% of households are families with children living in multi-family residential buildings (SCB, 2018d). But this is not the only ground for focusing the family life course household. The results of Study 1 have identified the neighborhood social dimensions as critical for family life course households. Staying in the same neighborhood throughout childhood allows children continuity in their social lives, supporting community, and schools, making it a critical and sought-after quality for the parents. Adaptable apartment space can in this situation enable a family to stay in the same apartment and maintain these qualities. Study 3 provides an opportunity to follow up on this finding.

3.2.3.2 *Collected data*

The empirical study involved a preparations phase of finding and selecting adaptable apartments, initial contact with the households, and the preparation and design of interview questions. The fieldwork involved the interviews with observations and documentations, and consisted of interviewing households in their home supported by illustrations of furnished floor plans of the apartment. The procedures for preparations and fieldwork are describe in greater detail below.

The study involved a number of adaptable apartments in realized multi-family residential buildings. The focus for the selection of these apartments was on their adaptable solutions; issues such as year of construction or location were of minor relevance, although all are fairly centrally located in Gothenburg. One premise for the selection was to identify realistic adaptability solutions that are feasible in terms of execution and cost: cheap to realize, easy to build, and fairly simple for residents or a hired helper to perform. The apartments I selected represent what I consider to be established ways of designing adaptable space. Nevertheless, in the context of current apartment design, these types of solutions are seldom practiced (Bygglövsboken: flerbostadshus 2014, 2015) The adaptable solutions found in these apartments represent the three strategies of adaptable space: general,

flexible, and elastic (1.3.2), and the apartments studied have one or two types of adaptable solutions each. The apartments are from three different multi-family residential buildings, referred to here as *Experimenthuset*, *Additionshuset*, and *Landshövdingehuset*. They include both rental and owner-occupied apartments, and since these two forms of tenure offer differing opportunities to modify the space of the home it has been important to aim for equal representation of both.

Among the selected buildings, Landshövdingehuset is distinctive due to the households' rare practice of adaptation. The residents of this condominium are engaged in a never-ending process of adapting the space of apartments that were not intended to be changed in this way. The process is handled through negotiation among neighbors. The apartments are elastic: they are regularly altered to become larger or smaller with the help of the adjacent apartment space.

The Landshövdingehuset example is familiar from the earlier Study 1, in which one of these living situations was analyzed. For Study 3 I have found this example to be relevant as what Flyvbjerg calls an atypical or extreme example. The atypical example often reveals more information in the situation studied (Flyvbjerg, 2001, pp. 77–81) since it can clarify the deeper causes behind a given question and its consequences rather than describing the symptoms of the problem and how frequently they occur. Flyvbjerg emphasizes that random samples chosen for representativeness will seldom be able to produce this kind of insight, and sees that it is more appropriate to select a few cases chosen for their validity (Flyvbjerg, 2001, p. 78). For Study 3 I found that the Landshövdingehuset example can illuminate relevant issues of adaptable housing design and the related social dimensions. The found the living situations in the building to be unexpected and bottom-up ways of using the space of the home. This makes it a good complement to the two other examples, Experimenthuset and Additionshuset, which represents less extreme ways of utilizing space.

BUILDING	HOUSEHOLD (*) / fictitious names		OCCUPATION	APARTMENT
EXPERIMENTHUSET	1	One person household: man OVE (76)	retiree : engineer	0-4 bedrooms, 87 m ²
	2	Two person household: woman ANN (69), man BJÖRN (65)	w retiree : office worker m: taxi driver	0-3 bedrooms, 72 m ²
	3	One person household: woman MARIA (67),	retiree : industrial worker	0-3 bedrooms, 72 m ²
ADDITIONSHUSET	4	Four person household: woman JULIA (44), man JONAS (48), children (15, 19)	w: teacher m: head master	3 bedrooms, 112 m ²
	5	Four person household: woman EVA (36), man KARL (35), children (2, 5)	w & m: architects	3 bedrooms, 112 m ²
LANDSHÖVDINGE-HUSET	6	Two person household: woman MIA (49), child (11)	artist	1 bedroom, 52 m ²
	7	Two person household: man LARS (60), child (17)	engineer	2 bedrooms, 70 m ²
	8	Two person household: woman FRIDA (52), child (17)	teacher	2 bedrooms, 74 m ²
	9	Four person household: woman TANJA (38), man JOHN (48), children (2, 7)	w: actress m: restaurant manager	2 bedrooms, 70 m ²
	10	One person household: woman JANE (83)	retiree : shop assistant	2 bedrooms, 44 m ²
*age, w:woman, m:man				

FIGURE 12 Selected households and apartments for Study 3.

The interviews were preceded by contacting the households through letters distributed in each building with permission from the landlord. Some contacts have also been made through snowball sampling (Noy, 2008). The effort to recruit participants has focused on family life course households (the interviewed households are presented in Figure 12).

The interviews were designed as semi-structured in-depth interviews and composed to illuminate the living process. The composition builds on a narrative subject introducing the past, present, and future time-line. The resident is asked questions in each of these tenses and relates a personal narrative of the living process. The narrative structure facilitates the targeting of social experiences and the household's spatial use over time. The questions have been thematic and open-ended, such as: *Who lives here? The earlier apartment: why move? Choice of this apartment? Dwelling qualities? How does the space work? Have you experienced overcrowding? Possibilities to adapt the apartment? Have you adapted the apartment? Future dwelling aspirations; spatial need? Moving or staying?*

The interviews were conducted and floor plan illustrations developed through visits to the households' apartments, which included interviews, photographing the apartment space, and surveying the furnished floor plan layouts. Each household was visited once and the interview carried out with one or two members of the household. The study thus did not treat each participating household equally. For example, three couples with children were interviewed but two of these interviews were conducted with only one member of the household. Thus the study explored the perspectives of individual members rather than the household as a whole.

All of the interviews were conducted over the course of approximately five months. I conducted the interviews alone except for one occasion when I was accompanied by a colleague. The visits most often started with a short tour around the apartment, after which the residents signed an informed approval to participate and then chose the site for the interview.

After the interview I completed the floor plan drawing of the apartment, including the furnishings and any spatial adaptations made. This sketch served as a memo and was recomposed for the presentation. With approval from the resident, I next took photos to be used as illustrations in the thesis and as a tool for completing and refining the furnished floor plans after having left the apartment. Each visit took approximately two hours.

3.2.3.3 *Analysis work*

The general strategy for the analysis in Study 3 was similar to that for Study 1 and, as stated above, influenced by Kathy Charmaz's book *Constructing grounded theory* (2014). The floor plans of furnished apartments are also, as stated above, analyzed using the method that can be described as figurative empirics, as in Study 1. The analyses for Studies 1 and 3 are further described in 4.2.1.3.

The analysis in Study 3 of selected data from the interviews and floor plans uses *directed content analysis* (Hsieh & Shannon, 2005). In which the focus has been on the understanding of the living process and its relation to spatial and social dimensions. The analysis of floor plans, applying a spatial focus, aimed to understand the preconditions for the use of adaptable space from a temporal setting, the design solutions' availability, and what situations the adaptability solves. The social focus aimed to identify how the living process relates to social aspects. The analysis work relied on the time-space model strategy, using diagrammatic floor plan sketches to illustrate living situations over time and map the households' changing spatial needs. The model provides a figurative understanding of spatial use and clarifies the relationship between space and the living process. The floor plans were drawn up to show the unfurnished space and to focus on adaptable design solutions, concentrating on the expanding and contracting spatial need in terms of rooms.

In each living situation, the spatial diagram (time-space model) and the residents' own subjective narrative of the experience of the living process were analyzed together in parallel in an iterative process employing inductive reasoning with the subjective understanding of both the researcher and the researched (Groat & Wang, 2013, p. 71). This resulted in *spatial diagrams*—interweaving social and spatial experiences over an extended time frame. The diagrams exemplify specific, experienced, lived situations in which the social aspects and the spatial needs are identified and analyzed.

3.3 RELIABILITY AND VALIDITY

The research design involves three studies where each one is designed to address the research questions asked and treat the complex nature of the issues researched, at the same time the inductive process allow the findings from the studies to feed into the other. The logic of the research design with the methods, data collection and analysis applied as well as my own

reflexivity all build the credibility of this research (Yin, 2013, pp. 81–111). The multiple data from the three studies and the theoretical approach contribute to supply different facets of problems to be explored, deepens the understanding and increases the scope.

The method used in Study 1 and 3 with empirical studies of living situations with interviews and floor plans describing the household's situation enable to understand the complex situation of the spatial use of the apartment and the social aspects involved. The research by design study, Study 2, constitutes a different approach processing the issue of adaptable design from the floor plan design perspective. This focus and the different method supply yet additional understanding of the question of adaptability, the living process with spatial use over time with the time-space model.

The proceeding with triangulation has opened up for generalizations of the findings (Yin, 2013, p. 101). The strategy with one extreme example (Landshövdingehuset), or as Flyvbjerg puts it an *atypical* example (Flyvbjerg, 2001, pp. 77–81), in Study 3 opens up for analytical generalization as it allows for to falsify generally accepted ideas of how apartment space is used, and the household's own engagement in the apartment's spatial solutions (Flyvbjerg, 2006, pp. 227–228; Kvale & Brinkmann, 2014, pp. 311–315). It is not likely that the type of collective adaptability process taking place in the example is what is considered as conventional use of apartment space and a conventional adaptability process.

Further the researches use of triangulation contributes to its credibility (Yin, 2013, pp. 85–87; Tracy, 2010, p. 843). In Study 1 and 2 respective Study 3, the theoretical framework has been triangulated. The social dimension framework by Murphy (2012) discussed in section 1.4, has for example been triangulated with the concept with the family life course approach (1.3.1) and the adaptable apartment strategies, generality, flexibility and elasticity (1.3.2). In Study 1 and 3 respective, the analysis of interviews and floor plans have also been triangulated.

Addressing the issue of my own reflexivity, my own starting point with own experiences and reflections, that understands adaptable solutions as something both positive but also challenging, has meant a challenge and I have needed to be sensitive to my own subjectivity through the research process, in how relevant aspects and issues are presented and nuanced in the introduction and the theoretical approach, as well as how interviews are conducted and analysis are made. To come closer to an objective standpoint, a nuanced and well-reasoned presentation of the research background and

theoretical presentation has been aimed at, as well as transparency about the methods and challenges in the research.

To uphold the consistency and attend to the reliability of the research, aim has been to be correct, transparent and rich in describing the research process applied.

3.4 ETHICAL CONSIDERATIONS

The ethical considerations for this thesis involve how issues of information and approval from interview subjects have been administered and how demands on confidentiality and utilization are fulfilled when it comes to the protection of the individual.

The households interviewed have all been informed about the purpose and procedure of the study through letters describing the subject and aim of the thesis, introducing myself, and outlining the proposed visit procedure with the interview, floor plan surveying, and photographing. The letter also informed residents of their ability to withdraw at any point during the study and that their participation would be anonymous. After being thus informed and giving their approval, the residents signed an agreement stating they wanted to participate in the research. The photographs used in the thesis have been approved by the households concerned before publication, as there is a possibility of identifying participating residents through the photos.

All information about the households involved has been manipulated to prevent individual identification. To maintain anonymity in the material presented, the names of the participants have been replaced with fictional names. For the multi-family residential buildings, the addresses are not given, but the building features may reveal enough information to allow people familiar with the context to identify them. For example, Experimenthuset is the only one of its kind, which can make identification of households possible.

4 RESULTS

This chapter recapitulates the results for the thesis. For Study 1, Social dimensions, and Study 2, Research by design, the results are presented already in 1.4, but are here shortly presented again to relate the results of the complete thesis in one chapter. For Study 3, Living processes, a more detailed review is presented.

The findings for Study 1 and 2 show three key results, one is that the apartment's capacity for adaptability, how apartment space can respond to the household's spatial needs, can be related to social qualities in the living situation. The second key result is the articulation of the living process as a critical component for housing design to embrace social dimensions, as the household's use of space over time relates to social qualities. The third key result is in the gap between the kind of apartment design currently being provided and the households' shifting need of apartment space. The current design does not to any larger extent observe the issue of the household's changed spatial needs, or the diversity of household types. The results from Study 1 and 2 are also more thoroughly presented in the licentiate thesis (Braide Eriksson, 2016, pp. 79–81)

The remaining part of this chapter will be aimed at presenting the results for Study 3. In this study the households' living situations have been studied in three multi-family residential buildings, Experimenthuset, Additionshuset, and Landshövdingehuset. The buildings are located in Gothenburg in the neighborhoods of Järnbrott, Guldheden, and Masthugget.⁶ Masthugget and Guldheden are fairly centrally located and Järnbrott is located a little further out from the central city core.

Reflecting some statistics (Göteborgs stad, 2019), Guldheden is an urban neighborhood with a younger population, a higher proportion of 20–29-year-olds, and a smaller proportion of 60–79-year-olds compared to Gothenburg as a whole and to the other two neighborhoods of Järnbrott and Masthugget. Masthugget has a little higher level of middle-aged people compared to the other two and Järnbrott a little higher level of elderly people. All three districts have smaller households (relative to the average for Gothenburg) and

6 Experimenthuset is located in Järnbrott, Additionshuset in Guldheden, and Landshövdingehuset in Masthugget.

the proportion of single-parent households is marginally larger than average. Järnbrott has a lower annual income level (282,000 SEK), Masthugget a higher level (309,000 SEK), and Guldheden about average (285,000 SEK) for the city of Gothenburg. All three neighborhoods have a higher proportion of people with only pre-secondary and secondary school education than the average for Gothenburg as a whole.

The three buildings have apartments with different types of adaptability representing generality, flexibility, and elasticity. Each multi-family building is here described individually, and for each I present one representative apartment floor plan featuring one or more adaptable design solutions. From the interviews the issues of adaptability and the social dimensions are related through four themes: *the household*, *the use of adaptable space*, *the perception of adaptable solutions*, and *the neighborhood*.

Lastly, for each of the multi-family residential buildings the spatial use over time is described in a narrative illustrated with a *spatial diagram* showing the floor plan and the use of space over time in the apartment. Many of the households have lived in their apartment a long time, which allows them to recount the expanding and contracting of the household as a course of events in space and time. The diagram is followed by the resident's narration explaining the living situation in the apartment together with the apartment floor plan. One example of a living situation is described for each building, with the exception of Landshövdingehuset, for which we have that two interesting disparate examples. The chapter concludes with a summary of Study 3, Living processes.



FIGURE 13 Kitchen in Experimenthuset.

4.1 EXPERIMENTHUSET

4.1.1 *The building and one apartment example*

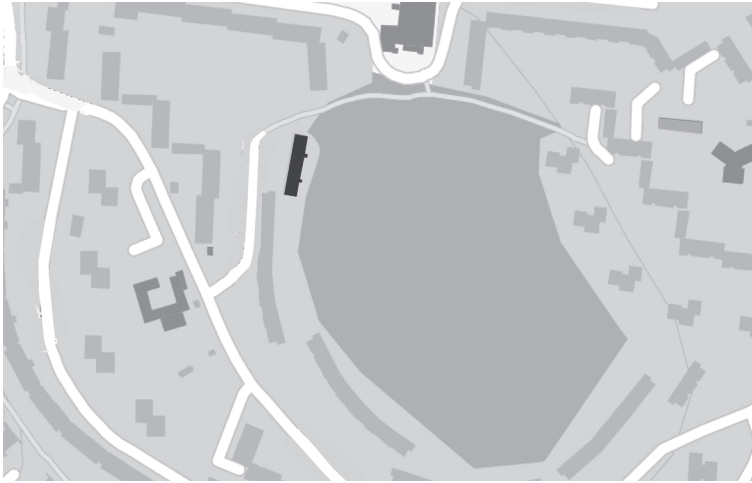


FIGURE 14 Site plan Experimenthuset.

Experimenthuset is a multi-family residential building from 1953 located on the outskirts of Gothenburg in Järnbrott. The building is situated as a solitary volume on one side of loosely enclosed courtyard with outdoor space for the residents (Figure 14). The developer was the municipal housing company Bostadsbolaget and the architects were Tage and Anders William-Olsson. The twenty rental apartments with varying sizes from 42 to 87 m² are adaptable through flexibility with dismountable wall panels, a rarity in the housing design of the 1950s. The building is still owned and maintained by Bostadsbolaget.

In 1986 Bostadsbolaget undertook a comprehensive refurbishment of the building that included, according to the janitor, Ulf Björk, wallpapering of the dismountable wall panels and adding electrical conduit to them to supply more practical locations for light switches (personal communication, 28 February 2018). There was no deliberate intent to limit the range of flexibility, but the work may have affected the residents' attitude to the flexibility by resulting in a visually more static expression. Through the years there have been two surveys investigating the residents' experiences and the employment of adaptable space (Andersson et al., 1988; Statens Institut för Byggnadsforskning, 1966). Some experiences from these surveys are presented in 2.2.1, and 6.1.2.

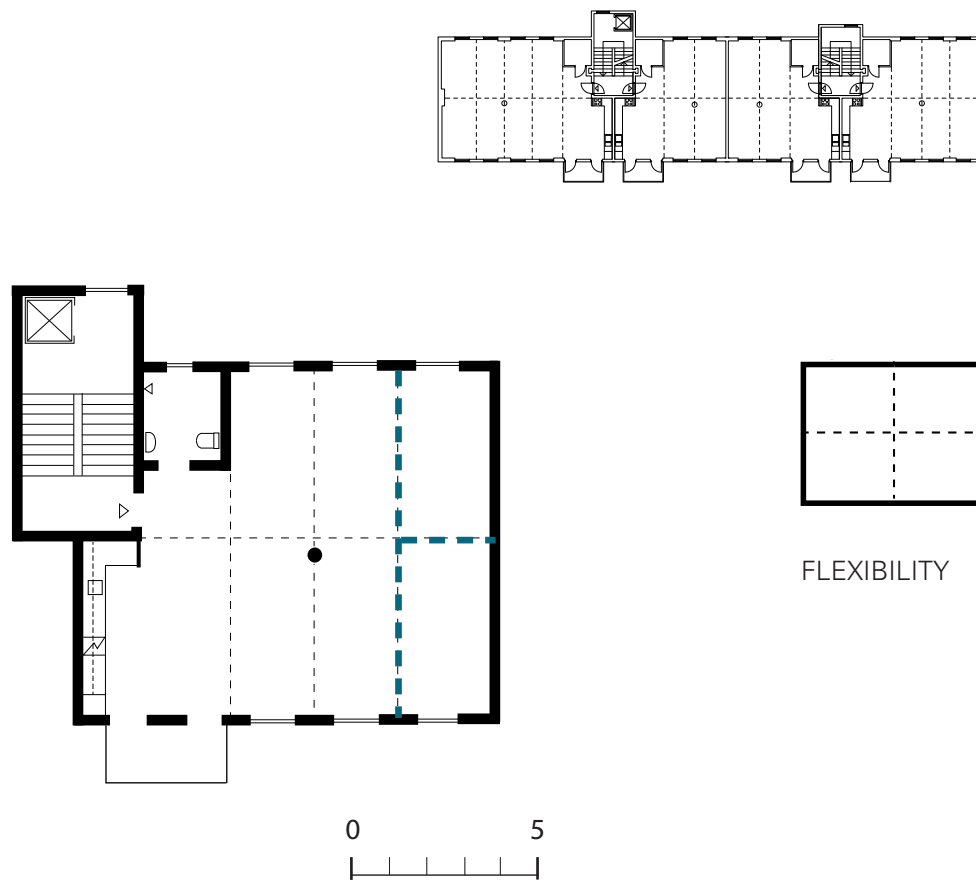


FIGURE 15 Experimenthuset, example of apartment floor plan showing the flexibility solution with the possible disposition of walls (crosshatched line).

The example above is an apartment of 87 m² (Figure 15). The flexible solution means that the apartment can be one large room (except for the bathroom space), but it can also be divided into a number of rooms along predetermined lines. The kitchen and bathroom are fixed and situated next to the entrance and a vertical chase for mechanical services (a common strategy in this type of adaptable solution). Figure 13 shows one kitchen from the interviews. The floor plan design allows several spatial combinations with varying number of rooms and sizes of rooms within the framed apartment space.

4.1.2 *The households*

Three households have been interviewed (Figure 16), almost all of the household members are today retirees. Two of the three households have moved to the apartment when their children already had left home.

HOUSEHOLD (*) fictitious names	APARTMENT	YEARS IN THE APARTMENT	VARYING NUMBER OF PERSONS IN THE HOUSEHOLD	USE OF ADAPTABLE SPACE
One person household: man (76) OVE.	0-4 bedrooms, 87 m ²	29	4 -3- 2 -1	X
Two person household: woman (69) ANN, man (65) BJÖRN.	0-3 bedrooms, 72 m ²	7	-	
One person household: woman (67) MARIA.	0-3 bedrooms, 72 m ²	21	2-1	
* age				

FIGURE 16 The households in Experimenthuset, size of apartment, time of residence and the households' expanding or decreasing in size.

4.1.3 *The use of adaptable space*

Only one of the three households has utilized the apartment's adaptability: the one with children living at home. When the children moved out, the walls to one room were demounted. Beside this no other changes have been made despite the long time the households have lived in their apartments (7, 21, and 29 years). Over the years, the apartments have provided sufficient space for the households, and in the event of the death of one spouse, the other has chosen to stay in the apartment, which has resulted in single-person households living in rather large apartments today.

4.1.4 *How are adaptable solutions perceived?*

In talking with residents, it becomes clear that they appreciate how unusual the adaptability of the building is. Two of the households interviewed are very proud of living in the building. They like the idea of adaptable apart-

ments even though one of them hasn't employed the facility themselves. The two households emphasize that the residents' ability to choose the design of their apartments is an important quality. One of them that has not taken advantage of the adaptability is nevertheless very positive to the idea and emphasizes that their family situation can change and their spatial needs along with it, which in turn can be solved with adaptable space (see quotation below). She also says that the potential adaptability provokes and inspires her thoughts on how to use the apartment space.

Ann, 69, about the ability to adapt the apartment:

I think it's very good if you can do it [change the number of rooms], especially if the family situation changes. You can live alone in a larger apartment and then suddenly there are two of you, and later maybe three. There are opportunities to do something with the apartment to adapt it for the needs you have at the time. I think that's really good.

Interviewer:

But why? Why not just move?

Ann, 69:

Well, because maybe you're so happy here. Maybe I'm happy with the neighborhood. It's close to work, close to schools, good schools and daycare around here. Maybe that makes me want to not leave [...] but I think it's really fun sometimes to sit here and think about you could change it. Take out the wall around the workroom and have a little room where the sofa is now and have a living room that goes all the way across ...

The one household that has utilized the system of movable wall panels sees this not as a complicated solution but rather as a manageable technique, but he thinks the noise reduction is poor.

Ove, 76, about the system of movable wall panels and how they work:

Really great! I think it's really great. You know, it makes it possible to change [the number of rooms easily]. / ... / I think it's too noisy. It's gotten better with these walls since the renovation. It was nois-

ier before, and much better now. Because before it was just raw, there was no wallpaper and you could see the gaps between the panels. You know, it was supposed to be modern, right? But the wallpaper helps a bit. So the insulation is different in these movable walls now. You can lie in there and snore and not bother anyone.

The two households that haven't used the adaptable solution are unsure whether it can still be employed. They claim to not have had any information on this, and they feel that the wallpapered panels signal inflexibility.

Ann, 69, about the movable wall panels, not knowing if the adaptability still works:

I don't know if it [the movable wall panel feature] works that way today. All the walls here are drywall now.

Interviewer:

Do you know if the walls are still movable after the renovation?

Ann, 69

No, I think they replaced them.

The single woman relates that it was her husband that urged her to move to the building, as he was fascinated with the adaptability issue, and now that he is gone she has no connection to this issue at all.

Maria, 67:

What, it's strange—moving walls around. You just can't do that in an apartment.

4.1.5 The neighborhood

All three households moved to their apartments from others in the same neighborhood. To feel at home in the area and to meet people you know or recognize are emphasized as two important qualities. Two of the households also claim that they wish to stay in the building in the future and have no plans to move, though the woman who lives alone would like a smaller apartment in the same building. The households I interviewed feel safe in the area, and note good transit options by bus or tram and a good supply of amenities such as grocery stores and community services.

Maria, 67, about moving:

No, I've moved so much in my life that I don't want to again ... No, I don't want to do that. It's a lot of work. [...] And everything is new and ... new neighbors, no ... Nope!

The households have contact with their neighbors in the building and the two households who have lived here longest have established daily contacts with neighbors.

Maria, 67, about gardening and places where the residents can meet:

Well that would be out there in the garden, out on the benches. We're out there drinking coffee when the weather's nice in the summer. [...] It's me and a neighbor from the third floor. We take care of the flowers all that kind of thing. When we first moved here there were a lot of people out there gardening. But there's no more of that now. [...] But when she got hurt last year, [her husband] had to take care of it—watering the flowers and stuff.

Residents help each other in daily chores, share responsibility for the courtyard flower border, and one also co-owns a car with his neighbor to save money. The common laundry room is a place for meetings, as is the small courtyard space with tables and benches where the residents meet for a coffee and a chat.

4.1.6 *The employment of space during a life phase*

In the next section I describe the use of space in one apartment in Experimenthuset using a spatial diagram with floor plans to visualize spatial use over time (Figure 17). The diagram is followed by a more detailed narrative in which text and apartment floor plan together relate the sequences of spatial use.

The example presented here is the household that has made changes in the floor plan, dismantling the walls to one room while living in the apartment. The household comprised four people when the first moved in, during the time when the children were teenagers. The children moved out and in time the parents divorced. Now the household consists of the father still living here alone. The apartment is large and has supplied the needed space through the years, and its adaptability, which can be considered extensive, has only been utilized a few times in 29 years.

4.1.6.1 *Experimenthuset: spatial diagram: flexibility*

Present household: Adult, Ove, 76 years.

Apartment 0–4 bedrooms, 87 m².

Time in the apartment: 29 years.

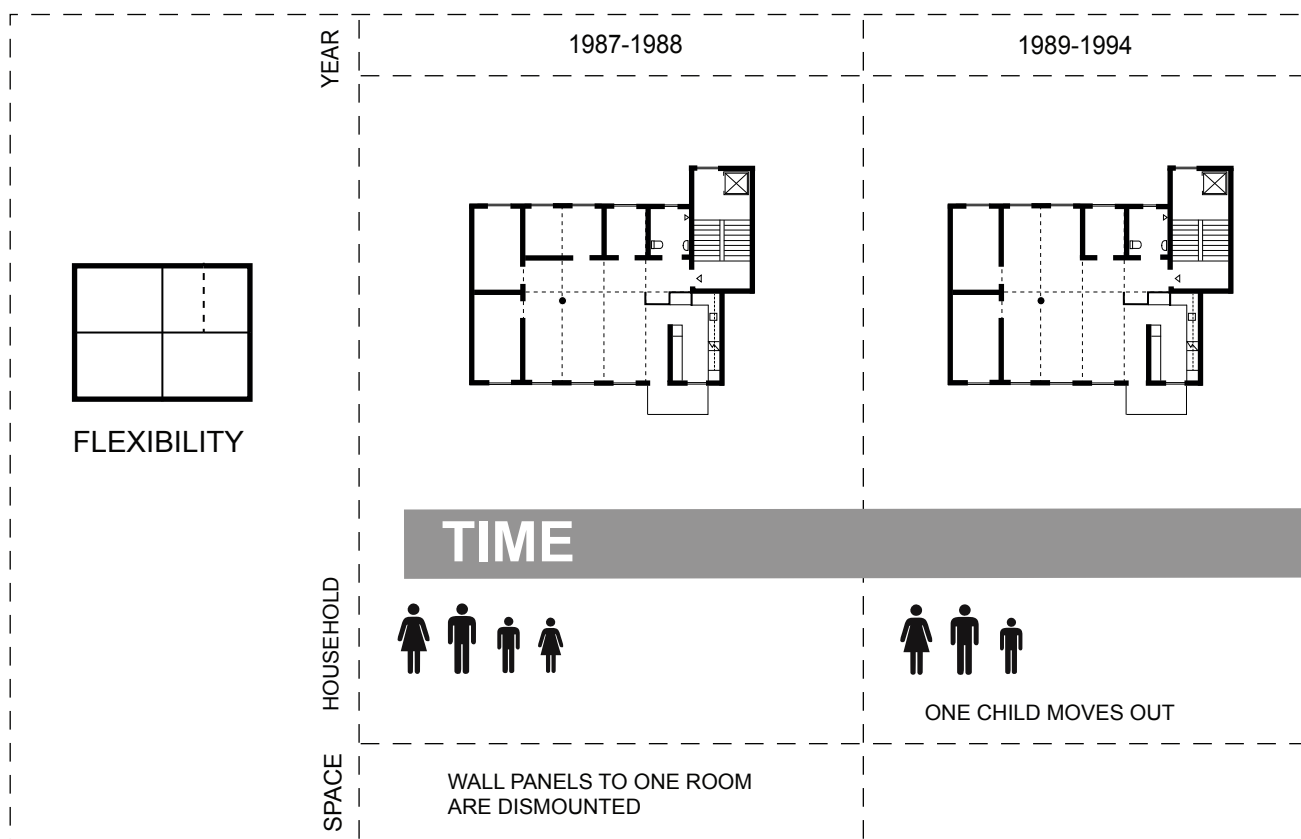
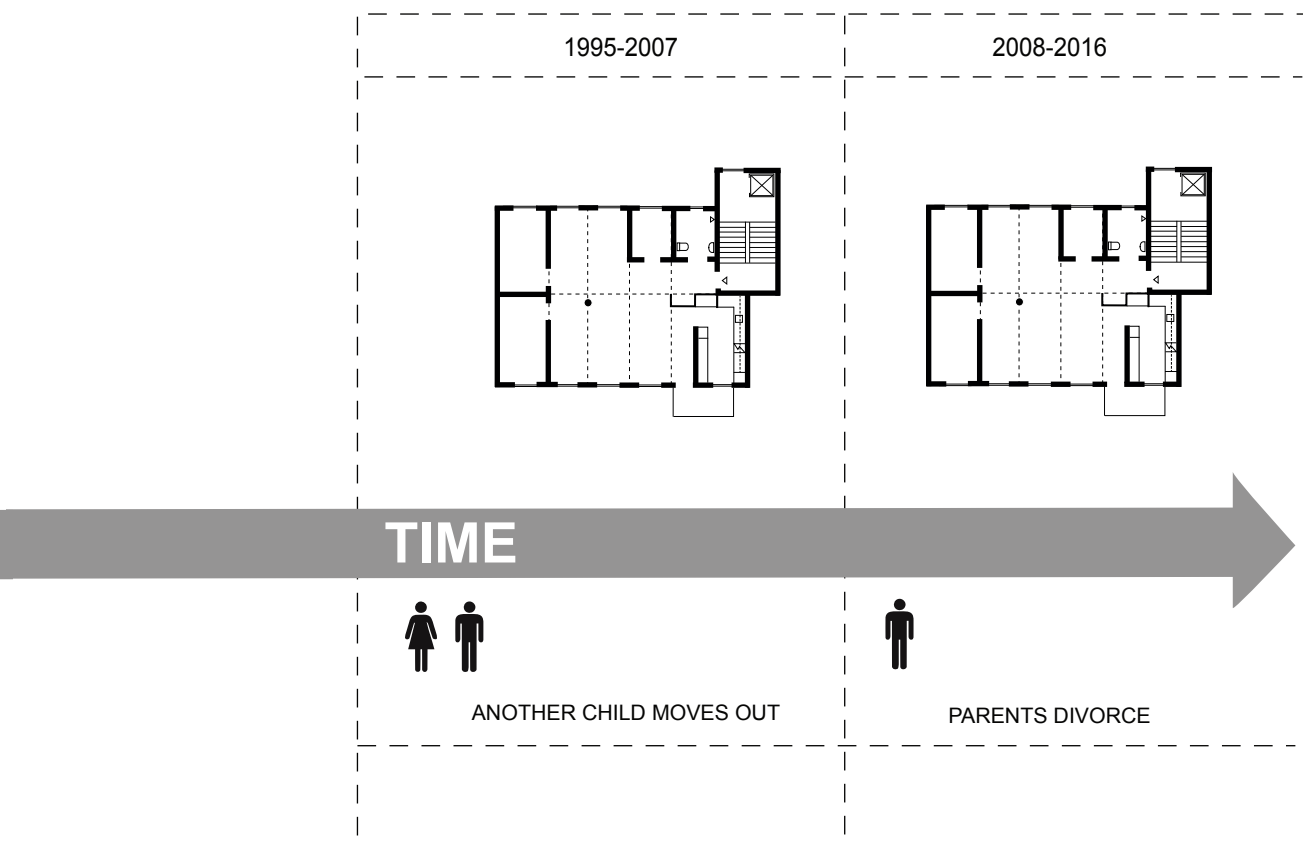


FIGURE 17 The diagram shows the household's size through the years, and eventual rearrangement of apartment space during expanding and/or contracting.



4.1.6.2 *Experimenthuset: a spatial narrative*

1987–88

The household moves into the apartment in 1987. They are two parents in a new family constellation with two teenagers. The man has been waiting a long time to find an apartment in the building just because of the adaptable apartment space. The teenagers are 14 and 16 years old, and when the household moves in they each have their own room in the apartment (Figure 18).

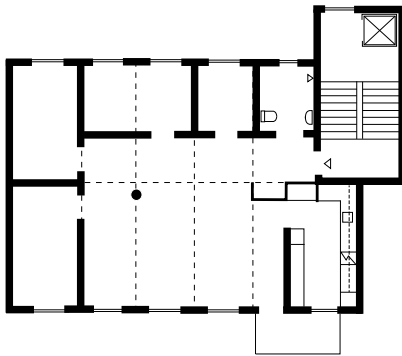


FIGURE 18

Size of household: 4
Number of rooms: 5

Ove about wanting to move to the apartment during a longer time:

It was really because we were on a waiting list from '82 to '87. My children were younger then and we needed more rooms. But it took a while before anyone moved out of here and something became available. There was quite a high demand for moving into this building.

1989–94

After two years one teenager moves out. That same year the building is refurbished and all of the residents move out temporarily. Before moving back into the apartment, the household decides to take away one room to create a larger living room (Figure 19). The demounted wall panels from the room are stored in the basement. A few years later, in 1994, the other teenager moves out.

About now wanting to move to a smaller apartment in another neighbourhood:

My favorite neighborhood is Kaverös. It's fantastic up there—quiet, safe, and really nice. And that thing about a community of neighbors, it really works there. It doesn't in this building anymore. [...] I don't need this big apartment.

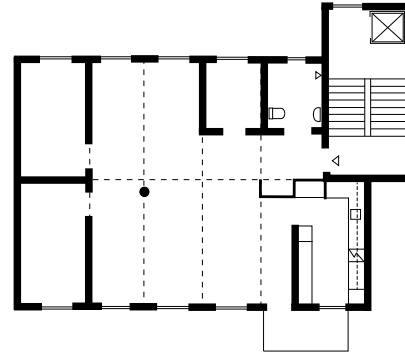


FIGURE 19

Size of household: 3–1
Number of rooms: 4

1995–2016

When the second teenager moves out, no changes are made to the layout. The small room instead becomes a place for sewing and study.

The man and woman divorce in 2008, and the man stays in the apartment. Today he finds it too large: many of the rooms are unused. He aims to change to another apartment in the near future. He likes the neighborhood but would like to move to a nearby area where he has some friends. He seeks a safe neighborhood and a smaller apartment with one or two bedrooms.

The narrative shows the development of a living process during a period of 29 years. The adaptability of the space has been sparsely utilized—only when the teenagers moved away from home. At this point the family life course situation petered, and there have been no further needs for alternative spatial solutions. Even though the adaptability has not been used frequently, it is still considered a huge quality, and the movable wall panels are regarded as a convenient arrangement by the one household that has taken advantage of the system.

4.2 ADDITIONSHUSET

4.2.1 *The building and one apartment example*

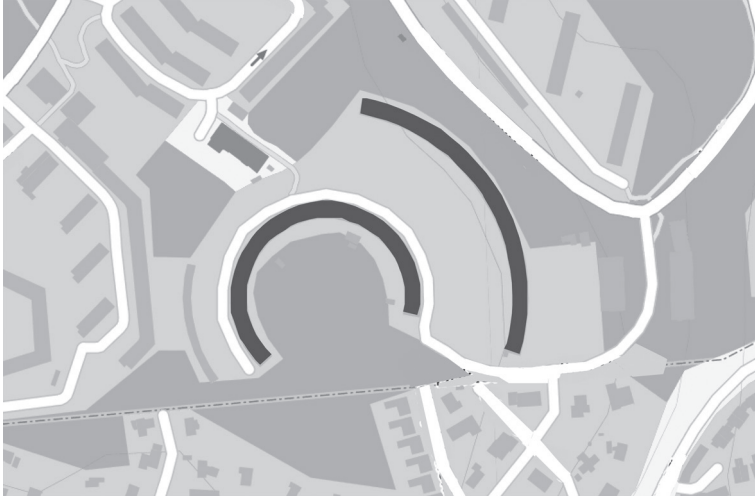


FIGURE 20 Site plan Additionshuset.

Additionshuset is a multi-family residential building from 1959 located in central Gothenburg. The building is one of two that together form a large-scale structure of circular segments surrounding a courtyard space (Figure 20). The complex was developed by the municipal housing company Poseidon and designed by John Snis. The 597 rental apartments vary in size from studios of 22 m² to four-bedroom units of 112 m², and the larger ones are adaptable through a combination of flexibility and elasticity. The building is today owned and maintained by Poseidon (M. Dahlgren, personal communication, 28 March 2019).

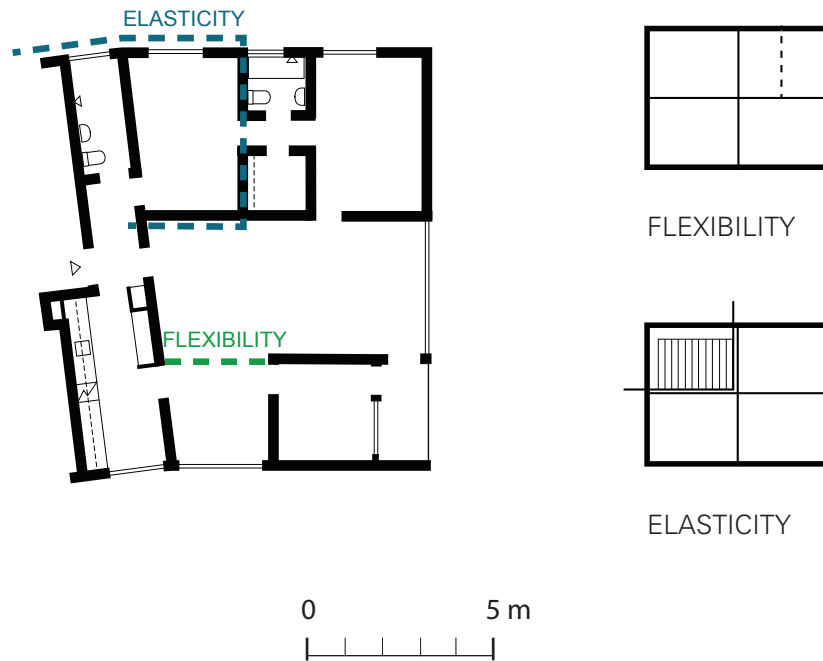


FIGURE 21 Additionshuset, example of apartment floor plan showing the adaptable solutions with flexibility and elasticity.

The example above is an apartment of 112 m² with both flexibility and elasticity solutions (Figure 21). The flexibility solution means that one room can be altered easily to become two rooms by inserting one additional wall (both resulting rooms would have windows). In this floor plan, the new space that can be created in this way is small, closer to a niche than a room in size, but I still consider the space interesting to study as a flexibility solution.

The elasticity solution means that one room in the apartment is located to allow it to be separated from the rest. It can be reached from the entrance through a neutral space (hallway) that also connects to kitchen and bathroom facilities. This could be a solution for a teenager who wants to keep a distance from the rest of the family, for example, or for a tenant. The solution of renting out a portion of the apartment to a subtenant can be understood as an elastic space response that enables the household to decrease its own living space and housing expenses. Not all of the apartments in the building have these two adaptable solutions.

4.2.2 *The households*

Two households have been interviewed in the residential building (Figure 22). Both are families with children, one with older and one with younger children.

HOUSEHOLD (*). fictitious names	APPARTMENT	YEARS IN THE APARTMENT	VARYING NUMBER OF PERSONS IN THE HOUSEHOLD	USE OF ADAPTABLE SPACE
Four person household: woman (44) JULIA, man (48) JONAS, children (15, 19).	3 bedrooms, 112 m ²	16	4-5-4	X
Four person household: woman (36). EVA, man (35) KARL, children (2, 5).	3 bedrooms, 112 m ²	0,5	-	
* age				

FIGURE 22 The households in Additionshuset, size of apartment, time of residence and the households' expanding or decreasing in size.

4.2.3 *The use of adaptable space*

The family with younger children has lived half a year in their apartment and is still settling in. They have plans to buy a detached single-family home or a row house in the near future and see the apartment as a temporary solution. Without moving any walls, they have shifted their use of the rooms a few times since they moved in because of water damage, though no other changes have been made in the use of space. Figure 23 shows the niche in their living room furnished with sofa and table.

The other family has lived in their apartment for sixteen years. They were a household of four when they moved in but very soon became five. They have been crowded during the years that the children have been growing up but have chosen to stay in the apartment and not move. They think that the apartment has some great qualities, such as the view from the balcony, the location in the building (an end unit), and the neighborhood area. Dur-

ing the time they have lived here their use of the rooms has shifted. They have utilized both the flexibility solution and the expanded. One of the bedrooms elasticity solution, but also some do-it-yourself solutions when the household expanded. They divided one of the bedrooms in two with a drapery to provide a room for working, used the living room for sleeping for a time, and divided one of the bedrooms in two with the help of bunk beds to provide a temporary two-bedroom solution for the smallest children.

Jonas, 48:

At that time we had a TV room in there, a workroom there, and then we had two kids in bunk beds in that room for a few months.

Julia, 44:

And then for a while we used that one as a bedroom and the boys shared that one and we had bunk beds right out there, and built in the bed. So from one side there was a hole down there and boards on the backside all the way up to the ceiling, and on the other side you had to climb up [into bed]. [...] It became two rooms.

Jonas, 48:

A room divider, we had built-in bunk beds. We had that for many years [...] It worked, but then when [one of the children] was twelve or thirteen, it wasn't so fun to have to go through little brother's room anymore.

4.2.4 How are adaptable solutions perceived?

Both the households in Additionshuset think of adaptable apartments as something positive.

Julia, 44, on her opinion of adaptable homes:

I think I want to answer you question with my own question: what could be the downside of changing or adapting? I guess it would be if it was awkward or ugly ...

The household with teenagers has come up with several do-it-yourself solutions to create an extra room in the apartment before employing the flexibility solution outside the kitchen. When asked what they think of the flexibility

solution they suggest that movable wall panels provided by the property management company can be a more feasible way to work with adaptable solutions in the apartment than having to supply the wall yourself.

Jonas, 48:

It may just be a matter of cost. It probably costs a little bit to build a solution like that into the building, maybe costs a little extra to have that ability. But I think for us it would have made it easier if I didn't have to drive up to Kungälv and buy an accordion wall and do the carpentry myself. Now I'm someone who can do it, but [...] But if Poseidon had an accordion wall we could rent, of course it would have been a lot better.

The other adaptable solution, the separate bedroom, on the other hand, has been used as a teenager's room for many years. One of the parents also considers this to be a room that can be rented out once the children have left home.

Jonas, 48:

We have a plan now. The room that's over there, if you think about how it could be changed, one option is to rent it out. So you install the doors here again, so then they get access to the hall and the bathroom and the kitchen, and then you can rent out that room, because it's very private over there. That's one future solution if it's just the two of us. It makes the rent more affordable.

4.2.5 *The neighborhood*

Both families have moved to their present apartments due to overcrowding, in both cases staying within the same neighborhood. The continuity with preschools and schools has been one critical issue, but qualities such as safety and social contacts have also contributed to their desire to stay in the area. The family with small children aims to be established in their row house by the time the children start school, believing this can build continuity from the start instead of coming in as the new kids after the other children have started.

The family with older children has a different situation. Soon all of their children will have left home, and after that they are not sure if they will stay in the apartment. They see the situation without children in the home as something new, a step into another time of life. It is no longer important

to stay in the neighborhood area even though that is still an alternative. If they stay, they are considering renting out one room in the apartment to get some extra income.

Jonas, 48:

So starting in the fall we may not have any kids at home, and I feel like something is going to happen with our living situation. We're not going to just have the two boys' old rooms just standing there, we're not going to do that. So it's a process that has already begun. Whether it's renting part of it out, or moving [...] In any case I think it's a process that has already begun.

The parents see the neighborhood area as having been a qualitative and important part of their living situation during the years when the children were growing up. That the area has been safe, that the courtyard and nearest outdoor area have fostered social cohesion and social interaction, and that schools and preschools have been located within walking distance have meant a lot. The parent in the other family views the courtyard space differently: he sees the courtyard as planned with “fake nature,” which he finds irritating, but he can also see the playground as a valuable amenity, with a playground and a small area with trees that are frequently used by children for play.

The courtyard space offers a natural place for meetings on weekdays when the residents arrive home from work and school, and both families have made many social connections through preschool and the social gatherings in the courtyard, they have both close friends and casual acquaintances here.

Julia, 44:

I still think that it's important to live near your children's elementary school, so that when they're very small they don't have to walk such a long way. It has been really good to live close to the school, so even if I didn't mention it before it's been really great the whole time. When we moved here it was obviously good to have this courtyard. We feel like, you know what, you can't find a better place to raise kids than right here. Because we sometimes say that, yeah this building is actually incredibly ugly from the outside—but this courtyard! This has been extremely powerful! [...] It was natural when you got home, if you picked up the kids when they were little, you often went out into the courtyard. They

wanted to run around out in the courtyard, and there was often another adult sitting out there too, so of course you'd get to talking.

The transportation options in the area are considered good by both families, with buses and trams that can be reached easily, although the supply of food stores is considered less satisfactory.

4.2.6 *The employment of space during a life phase*

The use of space in one apartment in Additionshuset is described below through a spatial diagram with floor plans to visualize spatial use over time. The diagram is followed by a more detailed narrative in which text and floor plan together describe the sequence of spatial use over time.

The example presented here is a household with teenagers that has been living in the apartment for sixteen years. Because they want to stay in the same home or neighborhood to preserve the qualities of social cohesion, they do not intend to solve their crowded situation by moving to another area. The household moved into the apartment when the children were small and so far one child has moved away from home.

Julia, 44, about the social life in the courtyard:

When the children were small, we wanted to stay here because it was quiet and a pretty safe environment with not much traffic and a reasonable distance to commute, easy to get to public transit and stuff. But the main thing was that it was quiet. The kids could walk on their own [...] I think that it's important to live close to school, that the kids don't have so far to go. When we moved here, it was obviously good to have this courtyard. It has been extremely important in the life of our family to have this courtyard—we really think so. You can't find a better way to live with kids [...] Of course it was natural when they were little to sit out there in the courtyard a lot ... because you meet people outside. You're out there with your thermos of coffee and you get started talking.



FIGURE 23 Niche of living room, Additionshuset.

4.2.6.1 *Additionshuset: spatial diagram: flexibility and elasticity*

The spatial diagram shows the sequence of changing spatial use for a household in the middle of the family life course (Figure 24). Various spatial solutions are employed to resolve the living situation.

Present household: Two adults, Julia and Jonas, 44 and 48 years old; two children, William and Sean, 15 and 19.

Apartment: 3 bedrooms, 112 m²

Time in the apartment: 16 years

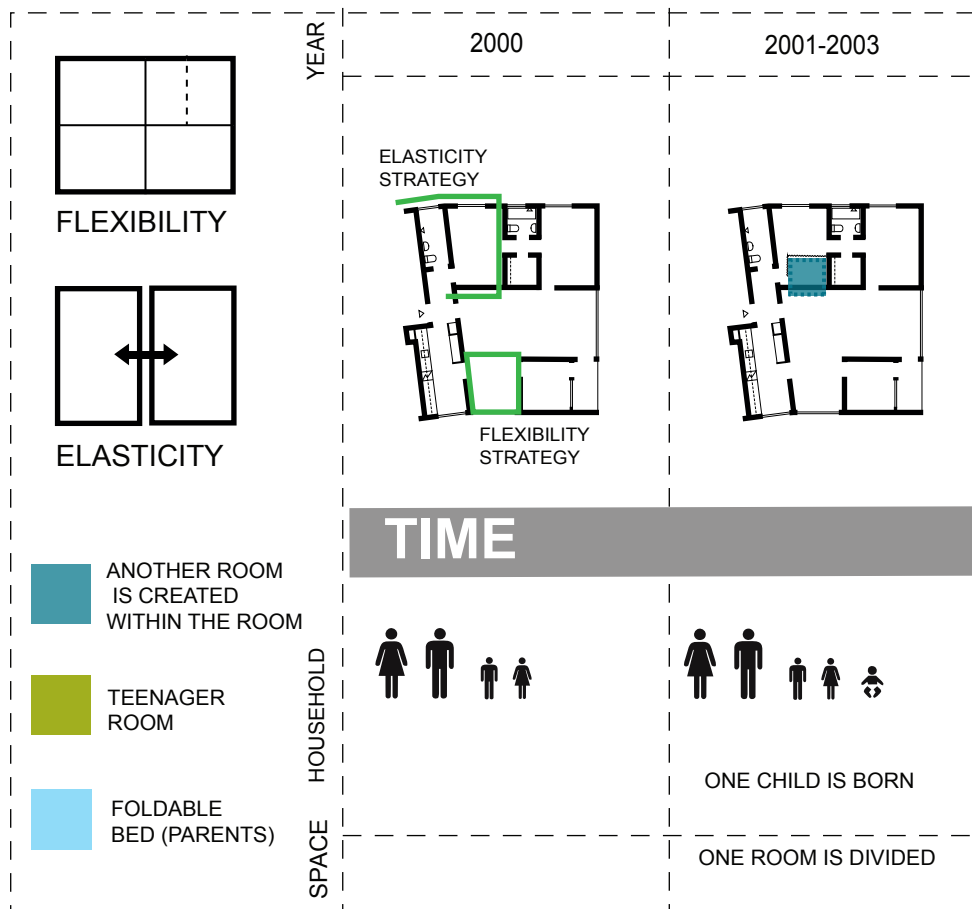
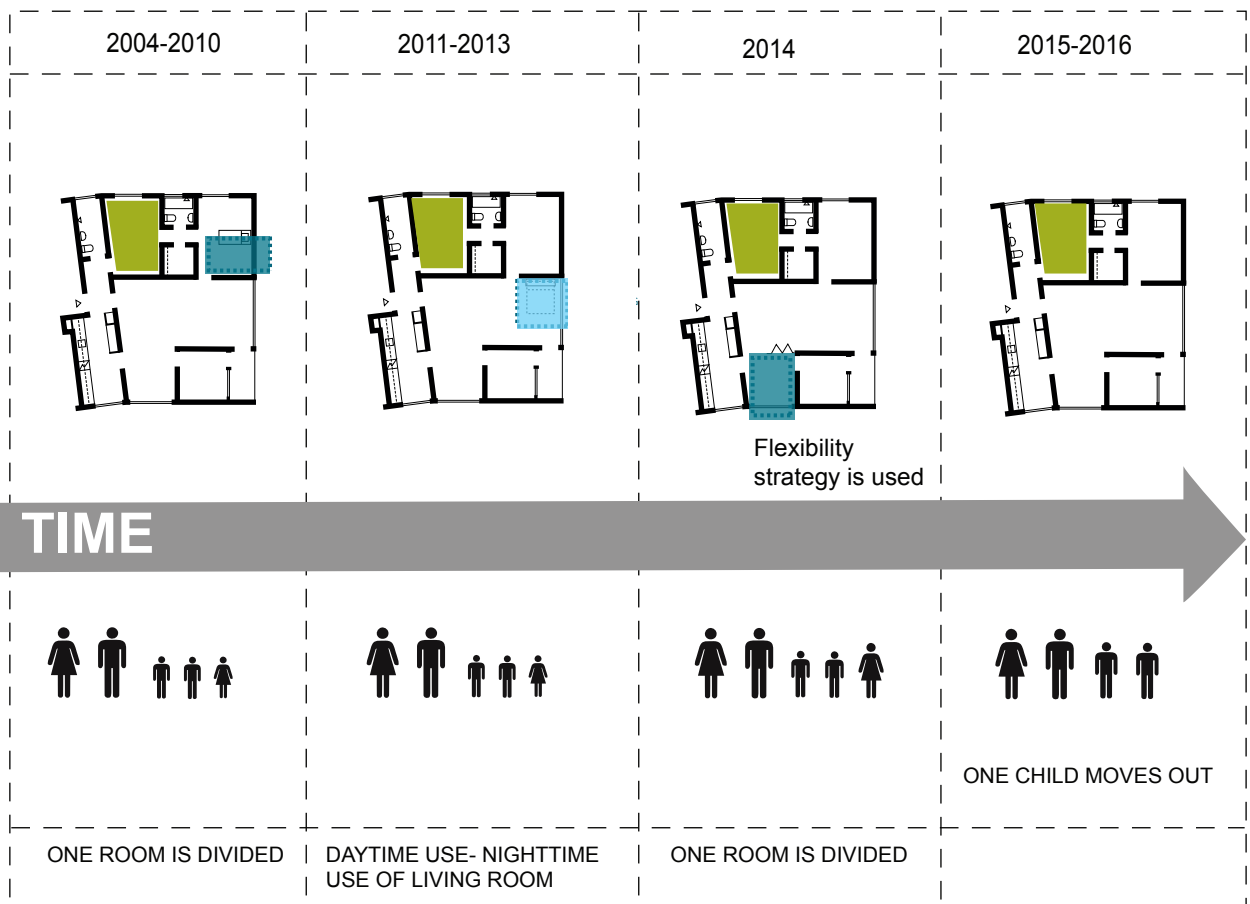


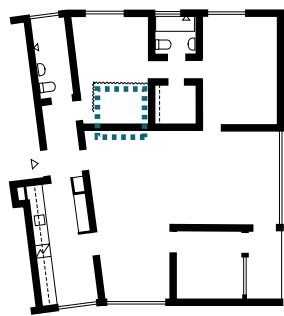
FIGURE 24 The household is crowded and the solutions mostly aim to facilitate an additional room, this room is marked in the diagram.



4.2.6.2 *Additionshuset: a spatial narrative*

2000–03

The family moves into the apartment in 2000. They have two children, 3 and 5 years old. They move here from a two-bedroom apartment because they felt crowded. After one year they have another child. One additional room is created in the apartment to be used for sewing and office work (Figure 25).



 ADDITIONAL ROOM
IS CREATED

FIGURE 25

Size of household: 5
Number of rooms: 5

2004–10

The oldest child has her own room, and a set of bunk beds was used to divide another room in two to give each of the younger brothers rooms of their own, although one of these rooms does not have a window (Figure 26).

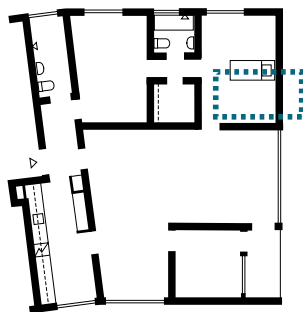


FIGURE 26

Size of household: 5
Number of rooms: 5

2011–13

The three children are now 11, 14, and 16 years old and all have their own rooms with windows—the three rooms that were originally intended to be bedrooms. The parents sleep in a folding bed in the living room (Figure 27). This solution lasts for two years, but does not work well. Coming home late in the evenings, the 14-year-old needs to cross the living room (where the parents are sleeping) to reach his room. He complains about feeling surveyed by the parents and is embarrassed to bring friends home.

Julia about the folding bed in the living room: *[Jonas] had built a cabinet that stood against the wall by that picture over there. And then we had one of those thick futon mattresses, and when we were done sleeping we had to lift the whole bed up against the wall, and we had like a floor that we locked.*

2014–16

To solve the situation, the parents form a small bedroom using the niche next to the kitchen (Figure 28). With the help of a folding wall, an additional room is created to be used as a bedroom. They consider it a tight space but it will have to do until the oldest teenager moves out.

Julia about the folding wall and the small space: *For a year or two we had a bed here with a folding wall. [...] So the same day our daughter moved out we rearranged the place and got a bedroom. Since then it's been a lot better.*

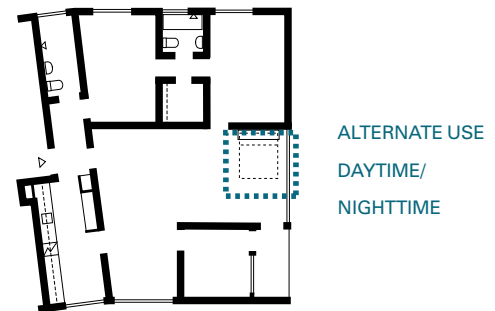


FIGURE 27

Size of household: 5

Number of rooms: 5

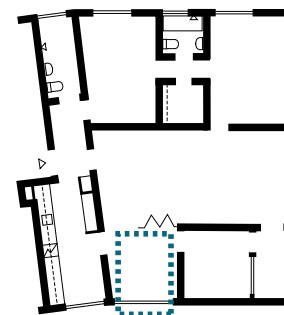


FIGURE 28

Size of household: 5

Number of rooms: 5

2017

When the daughter moves out, the folding wall is removed (Figure 29) and used by a neighbor in the apartment below who has five children. He aims to employ the same solution in his apartment to create an additional room.

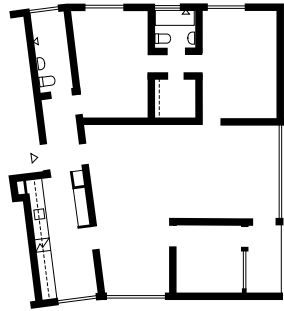


FIGURE 29

Size of household: 4

Number of rooms: 5

The narrative shows a living process as it develops over a period of sixteen years. In the family life course, there has been a continuous process with different ways of creating an additional room in the apartment. The flexibility strategy was not used until very late in the process. The elasticity strategy has been used to create a teenager room for many years, and this room is also understood as having the quality of being separate enough to rent out to a subtenant.

4.3 LANDSHÖVDINGEHUSET

4.3.1 *The building and one apartment example*



FIGURE 30 Site plan Landshövdingehuset.

Landshövdingehuset is a multi-family residential development from 1931, located in central Gothenburg, consisting of a number of perimeter-block buildings surrounding two courtyards (Figure 30). Together the owner-occupied apartments form a condominium. It was developed by HSB, a tenant-owned housing organization, and designed by Erik Friberger.

The buildings in the complex are a local Gothenburg building type known as *landshövdingehus* that was common in the early 20th century. Typical for these buildings is the height of three stories with the ground story built of brick (a fire precaution strategy). These types of multi-family buildings originally housed working-class households in small apartments, often in crowded conditions (Nylander, 2013, pp. 59–60). It is common today is that small households live in *landshövdingehus*, and occasionally the apartments are also merged to form larger apartments. The units in this complex were originally studio and one-bedroom apartments of 30–35 m² and 40–44 m² respectively, but as described below the apartment sizes have changed over the years (I. Bexell Hultén, personal communication, 28 March 2019).

The apartments in this complex demonstrate rare examples of how adaptability can allow residents to reorganize the space of their homes. The

genesis for this adaptability strategy in the complex started with the matter of the apartment sizes. The small size of the original apartments was leading to considerable turnover as households sought larger units with more space. This meant that growing families moved out, which resulted in poor continuity among the residents. To change this the condominium board decided to keep an open attitude toward refurbishment aimed at expanding the small apartments. Today this strategy has meant that many of the households have expanded and stayed many years in their apartments, thereby increasing the continuity in the buildings. There is also a cooperative daycare in the block run by parents who live in the complex. This too has contributed to the continuity and social cohesion.

The constant ongoing process of adapting apartment space means that apartments are continually being altered to become larger and smaller (Figure 31). The apartments are expanding or contracting, combining both vertically and horizontally with adjacent apartment space. The process is handled through negotiation among the neighbors in the condominium. Some households do the refurbishment themselves, while others hire contractors.

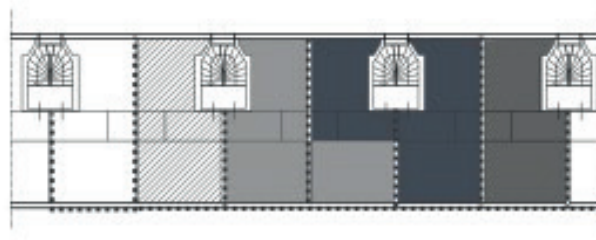


FIGURE 31 The constant process of expanding or contracting residential space results in many different apartment configurations and apartment sizes.

The strategy to let the households govern their own dwelling space is perceived by the residents I spoke with as a huge quality. However, it is essential to note that this type of renovation and expansion can be exercised because these are owner-occupied condominium units; it is not likely to take place in rental apartments. Still, the example stretches the boundaries of what adaptable space can be.

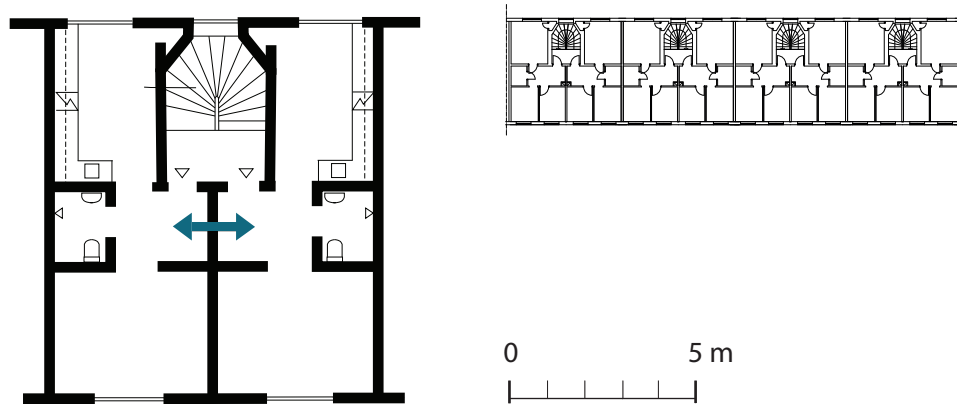


FIGURE 32 Landshövdingehuset, example of apartment floor plan showing the adaptable solutions with generality and elasticity.

The floor plan example presented above shows two apartments of 35 m² each on either side of a stairwell where the rooms have a general layout solution (Figure 32). The rooms in this type of apartment were originally used for multiple purposes due to the lack of living space. When a family of four or five lived in a studio or one-bedroom apartment, all the rooms served as bedrooms at night and for social gathering and daily chores during the day (Nylander, 2013, p. 40).

The rooms in the apartment are organized around a neutral space, the hallway, with the entrance to the unit. This arrangement allows the kitchen and other room(s) to be accessed separately, which made it easier for different households to share an apartment.

The original apartment layouts offered generality but no other intended adaptability. In recent years, however, residents have been expanding and contracting the size of their apartments through a strategy of elasticity. This kind of spatial adaptation presupposes that the building is constructed with framing and finishing materials that make it fairly easy to merge units, and also that the configuration of rooms allows for qualitative room sequences after the merger. The elastic adaptation also depends upon mutual agreement between neighbors, which can be a difficult challenge to solve.

4.3.2 The households

Five households have been interviewed in the Landshövdingehuset buildings (Figure 33). Three of these are single parents with shared custody and with children still living at home, and these households have lived in the apartments for between 25 and 27 years. Another household interviewed is the family with small children that has lived four years in their apartment, and the last household consists of an older woman, 83 years old, who has lived her entire life in the same one-bedroom apartment.

HOUSEHOLD (*). fictitious names	APPARTMENT	YEARS IN THE APARTMENT	VARYING NUMBER OF PERSONS IN THE HOUSEHOLD	USE OF ADAPTABLE SPACE
Two person household: woman (49) MIA, child (11)	1 bedroom, 52 m ²	25	1-2-3-2	X
Two person household: man (60) LARS, child (17)	2 bedrooms, 70 m ²	27	3-4-5-2	X
Two person household: woman (52) FRIDA, child (17)	2 bedrooms, 74 m ²	27	3-4-5-2	X
Four person household: woman (38) TANJA, man (48) JOHN, children (2, 7)	2 bedrooms, 70 m ²	4	-	
One person household: woman (83) JANE.	1 bedroom, 44 m ²	83	4-5-6-4-3- 2-1	X
* age				

FIGURE 33 The households in Landshövdingehuset, size of apartment, time of residence and the households' expanding or decreasing in size.

4.3.3 The use of adaptable space

Three households have adapted their apartments by expanding or contracting in correlation with the adjacent apartment space. These are the three single-person households. They moved to the apartment before divorce, when their children were small, and expanded the apartment space when the family grew, buying rooms from their neighbors and sealing one of two entrances, as only one was needed. When the couple divorced, instead of moving away they both stayed in the apartment but divided the space and opened the second entrance again to give access to two apartments. This solution of two adjacent apartments with the children's rooms in between meant that the children could stay in the same room after the divorce and not move from one parent to the other every week.

The household with small children has not adapted their apartment but has heard about the possibility to expand or contract space and already plans to remain in the building as their children grow up. They are thriving and think that they can expand their apartment in the future. The fifth household is the elderly woman who has lived her entire life in the same apartment. She is not interested in adapting the apartment by expanding or contracting it. One household, the older woman, has constantly used the general, interchangeable rooms for different purposes, for example social gathering in the day time and sleeping at night.

4.3.4 How are adaptable solutions perceived?

The generality strategy, rooms that can be used in a variety of changing ways without moving walls, has been used frequently by all the households. The examples are many: kitchens have been moved from the courtyard side to the street side, living rooms have been converted into bedrooms and vice versa.

The elasticity strategy requires more construction work, though the three single households have performed many of the spatial changes themselves through the years without help from a carpenter. These renovations do not appear to have been technically challenging for the residents interviewed, but one can sense a weariness in them—that it has been a bit too much. And yet they are positive to the idea of the residents' empowerment to adapt their own apartments. The driving force for the spatial refurbishments undertaken has been the households' desire to stay in the neighborhood. In this context the strategy of the condominium board to allow the households to adapt their apartments to solve their crowded situation appears to have been a huge success. The households also note that the adaptation of living space taking place in these buildings is now widely known and has contributed to

their future planning of where to live: even the families with small children planned to stay a long time, knowing they could adapt their homes to provide more space as they grew, in order to attain the social qualities with neighbors.

In the interviews the households emphasize the importance of being able to plan and adapt their apartments themselves, and point out the value of the condominium board's policy of enabling adaptability to provide continuity for the residents. The upper levels of the *landshövdingehus* type are wood-framed, and residents note that this makes it easier to adapt the space.

Interviewer:

How do you see the issue of housing over time if you compare the way you live here with a standard housing situation that doesn't allow you make these kinds of changes? Do you think that would have worked just as well?

Frida, 52:

No, it wouldn't have been as good. We didn't know that when we moved in, that this place with these apartments, usually with wooden walls, that it's pretty easy to modify. And there's a permissive board in the condo association—that's definitely been one of the reasons. I have to admit, it's been fantastic.

Mia, 49, rents out apartment space to afford the life as artist:

... Now I can afford to keep [my studio] because I can rent out [part of the apartment]. It's generous to be able to do that [...] It's almost like they allow us to be kind of like homeowners here in the association, I think. That creates almost the feeling that I have a house where I can kind of do as I like ...

... But most of all it's the continuity. When you create that kind of flexibility, you know it means you can keep living there longer because I have the freedom to kind of do whatever I want. And that means I can maintain that contact with all the friends I've made since I moved here in '91. And then for [the child], too, so there's stability because his parents aren't moving around so much.

The single parents insist that their building's elasticity has been especially important after the divorce, making it possible not to split the children from their home or force them to travel between two homes.

Mia, 49, about living next door to her ex-husband after the divorce:
... And during the time when it was Dad's week I never locked the door so that Tage could just come in and have a clementine even though it was actually Dad's week ... It was like we had gotten divorced and were separated by a great distance in one way but also very—geographically—still extremely close to each other, Martin and I, in that way. And we heard each other a lot, and we could tell when the other had company over, so ... so that was a little strange ... But it was still nice, practically speaking, with the way it worked for Tage, a good solution for Tage at first, because he was still pretty little then.

Residents emphasize the ability to come up with their own preferred spatial solution in response to a difficult situation.

Interviewer:

Let's consider the issue of overcrowding and the ability to change your home if you need an additional room. You've had to wait for opportunities to expand and add more space, but do you think it's a valuable attribute to be able to add on rooms to the home?

Frida, 52:

Yes, it's incredibly valuable. I mean so fundamentally, and it's really very much about ... about the fact that we've gotten divorced and have children together. That situation is so peculiar because you ... there's a legitimate dilemma, like a legitimate deep-running conflict in the fact that we're two adults who don't want to live together anymore but who both want to live with our children. So then that possibility has a value that can't be compared to other situations, I think. [...] So it's very unusual to be able to find solutions where you can actually unite these different interests that the different family members have—which you normally can't find solutions for.

The possibility of renting one room out once the children have left home, if the apartment seems too large, is also considered.

Lars, 60:

That issue is going to come up when [the son] leaves home, because then I'll have an extra room I don't feel like I'm going to need. So the thought has occurred to me that I could rent it out—partly because when he moves out I might retire, and I haven't really saved all that much, so I'm not sitting on a big pot of money when I retire. So that could be one source of reducing my costs.

Interviewer:

So you're not uncomfortable with that idea?

Lars, 60:

No, not at all. I don't think so.

The older woman I interviewed grew up with her parents and sister in the same one-bedroom apartment she lives in now. They moved in when the building was new. Over the years she has lived in the apartment as a child and as a single adult; with a husband, a child, and her mother; and today she lives there alone. During her time in the apartment she has had to solve challenges similar to those faced by the other families, including the need for more space and for using the same space in a different way. But she has had totally different expectations for what the apartment can do for her. She never considered the idea of expanding or refurbishing the space; instead, she has used the rooms for different tasks during day and night—the same space for socializing and for sleeping. Figure 34 shows the kitchen in the apartment.

Interviewer:

Can you tell me how the apartment was used when your mother, your husband, you, and your son lived here together?

Jane, 83:

At that time we set it up so when Mom was home she was in the living room and we [my husband, son, and I] had the bedroom. [My son] was little then, and he slept in a separate bed. And that is more than sixty years ago, so it's ... It was a different time then. You probably wouldn't do it the same way today.

Interviewer:

But you made up a bed for you mother in here?

Jane, 83:

Yes, exactly, on the sofa in here.

During some periods the household has been crowded, but Jane insists that there was no such thing as an impossible situation; instead, everything worked out fine. At the same time, she is aware of the ongoing process in which her neighbors have been expanding and contracting their apartments. This idea remains foreign to her: she considers it too complicated and also thinks it results in strange floor plan solutions.

Interviewer:

I have a question about changing the apartment. If you could make one more room within the existing apartment, or if you could add one more room outside it in order to make it bigger, what would you think of that?

Jane, 83:

Well I really don't think so, because then you'd have to go into the stairwell there and make holes in the walls out there, so then you get two halls, so then they're going to ... No, I think that's completely unacceptable to do it like that. I don't understand how they can live like that, actually. I mean then it's not like an apartment anymore—it really isn't!

4.3.5 *The neighborhood*

Three of the households I interviewed have moved to different apartments within the same block in order to get more living space while keeping the neighborhood qualities. They consider the social qualities of the area a critical motivation for wanting to stay.

Some of the households I interviewed want to stay in their apartment and the neighborhood area in the future: The older woman sees no point in moving at her age, and two of the households with single parents are considering staying on and renting out one room for some extra income to supplement their pensions. The parents with small children feel that the

social life in the neighborhood is very much geared to families with small children, and they are considering leaving the area once the children have grown up.

The two courtyards at the center of the block are places for social gatherings, events and parties. Many of the children who attend the preschool also live in the block, and their parents participate actively in the school activities. This leads to many contacts and common interests among the households.

Mia, 49:

When it gets warm out I like to sit out here on a bench and have a cup of coffee. There are a lot of nice places to sit here. Usually I sit on the bench outside the entrance. We also have parties, although I'm not so very sociable with those. We have a party every fall and spring for the whole condominium association. In the spring we have a flea market for the two courtyards, and we have dumpsters so you can throw things out. The kids love that, of course—this is a super friendly place and there's often someone bringing food to share. Between these two buildings there's also a place where we hang up our laundry when it's warm out, and we usually have a party there in September, and sometimes even show a movie. We also have an event space we can use for parties and other things. But it's the laundry room where I have the most conversations with neighbors—I like being there.

The Landshövdingehuset complex is perceived by residents as safe, and the proximity to a huge city park is seen as a great quality. They think the access to transit by bus is good and the location in the city is central, with many services available at short range.

4.3.6 *The use of living space during a life phase*

The use of space in two apartments in Landshövdingehuset is described below. In one example the spatial configuration can be seen as benefiting from both generality and elasticity, and in the other only the generality strategy is found. For each apartment the use of space is presented through a spatial diagram with a floor plan. This is followed by a more detailed narrative for each example in which text and floor plan together describe the changing use of space over time.

The two examples from Landshövdingehuset consist of one of the households with a single parent who has lived in the apartment for 27 years, and the household with the elderly woman who has lived her entire life of 83 years in the apartment. Like the two earlier narratives, these two examples show the family life phase to be a period in which spatial needs change over time. The two households are in different living situations today but have both lived through family life situations involving cohabitation, child rearing, and divorce in their respective apartments. It turns out that the two examples represent two diametrically opposed attitudes to the issue of spatial use and adaptable space.



FIGURE 34 Kitchen in Landshövdingehuset.

4.3.6.1 Landshövdingehuset: spatial diagram: generality and elasticity

As in Additionshuset, this Landshövdingehuset household has chosen to stay in place and adapt their home as their spatial needs have changed in order to benefit from the social qualities conferred by the neighborhood. They moved to the apartment when the children were small, and since that time the parents have divorced and two of the three children have moved away from home. The parents share joint custody of the children, and today the household consists of one parent and one teenager every other week.

The diagram below illustrates the changing use of space in the apartment over time (Figure 35). This household has addressed its changing needs by expanding when the family was growing, incorporating space from adjacent apartments, and contracting when divorce decreased its spatial demands.

Present household: Lars, 60, and Michael, 17 (every other week).

Apartment: varies in size

Time in the apartment: 27 years

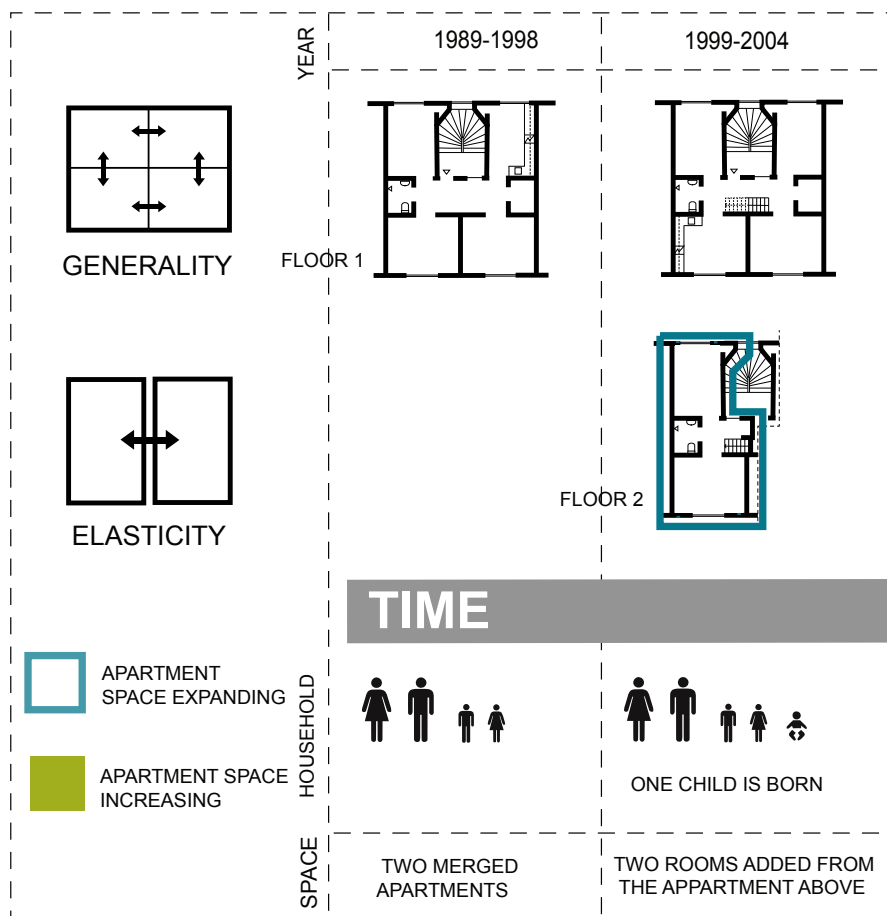
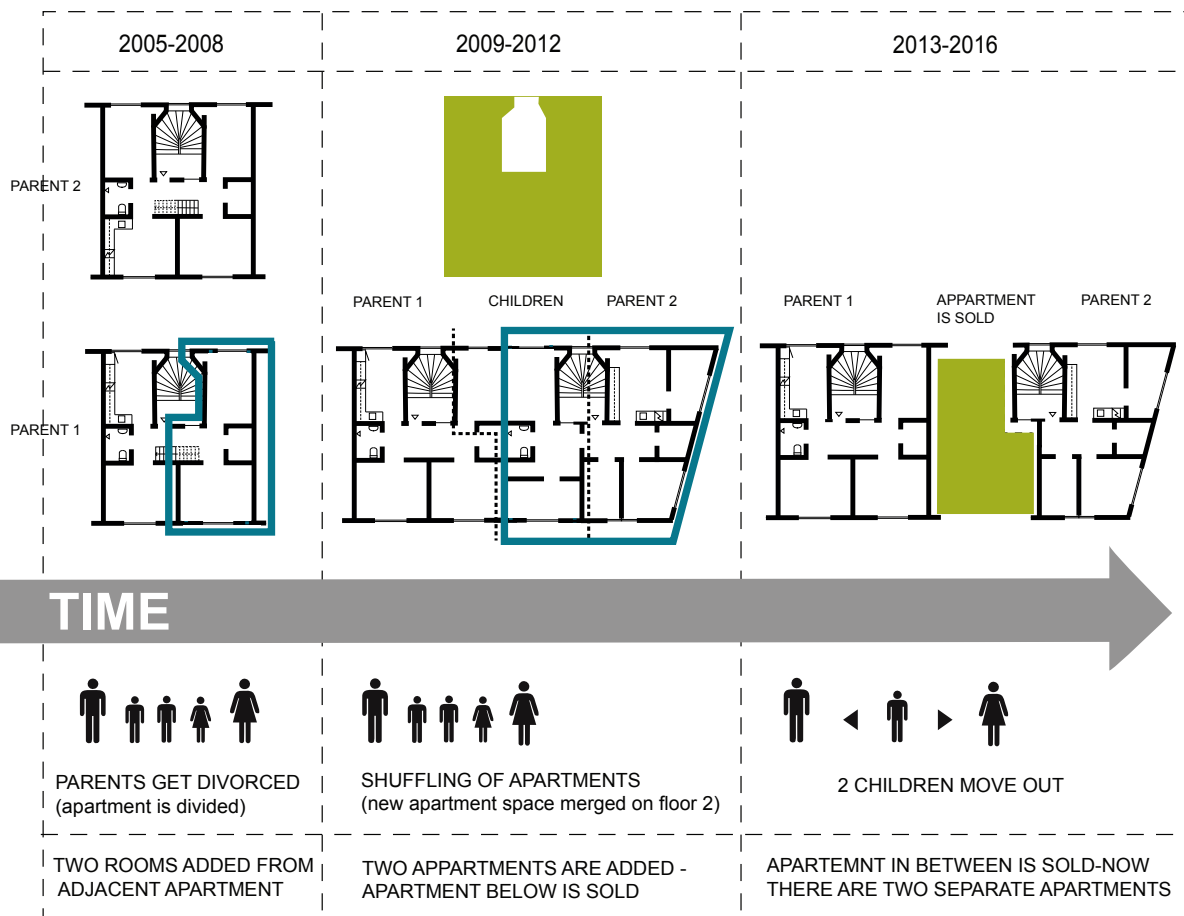


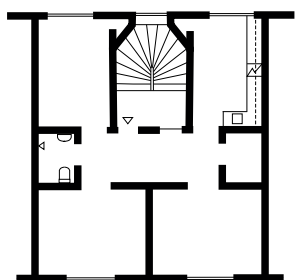
FIGURE 35 The household is crowded and the apartment space is expanded and later contracted as a consequence of the situation with: nuclear family, divorce, and children moving away from home.



4.3.6.2 *Landshövdingehuset: a spatial narrative*

1989–98

The two parents previously lived in a one-bedroom apartment in the same development. When they were expecting their first child they moved to this two-bedroom unit, which had been formed by merging two smaller units (Figure 36). Soon they have another child, and although the household is crowded they choose to stay.



Lars about when they met and moved: ...
And then I met Frida, and then she moved in with me there. And then she got pregnant so we moved down here to the floor below ... because we were going to need more than one bedroom when the baby came. So then we redid the place, fixed it up—we did quite a bit of it ourselves.

FIGURE 36

Size of household: 4

Number of rooms: 3

1999–2004

When the parents are expecting their third child they decide to expand the apartment. They buy the studio apartment above them and join the two with a staircase (Figure 37). The three children can now have their own rooms. They also enlarge the kitchen by switching it from the courtyard side of the apartment to the street side.

Lars about when the family expanded and they merged their apartment with the one above it:

We lived like that until the kids were eight or nine years old. Then Annika got pregnant again. So we decided then to buy yet another apartment above this one. [...] That was a pretty major job we did then. We moved the kitchen, which is located on the courtyard side in most of the original layouts, into the big room, and then made [the former kitchen] into two rooms. We wanted to have a staircase here from the lower level up to here, and it took us a year and a half to get it done. [...] It was finished to the turn of the century. So we had a housewarming party here and everything was just about finished by then. So that gave us a four-bedroom apartment, and of course that felt great.

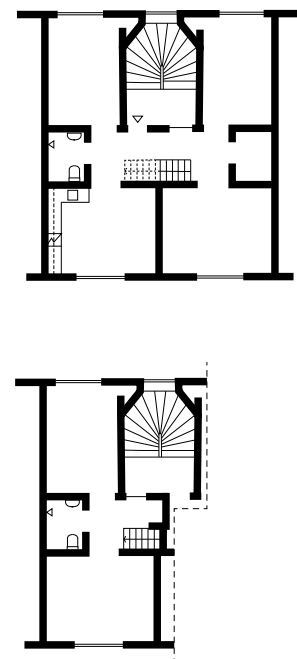


FIGURE 37

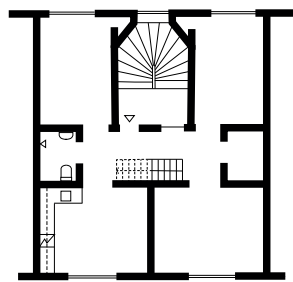
Size of household: 5

Number of rooms: 5

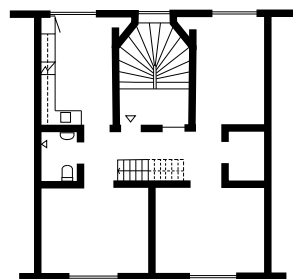
2005–08

The parents divorce. To provide what they consider a safe solution for the children they choose to stay in the apartment and use it as two units separated by the staircase, giving the parents one floor each. They also acquire the adjacent apartment on the upper level to make this unit larger. The parents now have equally large apartments on the two floors (Figure 38), and the children can stay in their rooms and do not have to move weekly.

In the long run this scheme does not turn out well: the linking staircase is a source of disturbing noise and too much distraction. Instead they decide to remove this interior staircase and use the two units separately, each with its own entrance from the common stairwell.



FLOOR 1



FLOOR 2

Lars about when they divorced and divided the apartment space: *But in the end we decided to separate. [...] First we just put up a wall here, so the kids were sleeping both upstairs and downstairs ... so when I was going to put the baby to bed I had to go down the stairs and that wasn't going to work in the long run. So we took away the staircase and we lived separately, you might say, for a short time. [...] I bought this other part and we took out the stair.*

FIGURE 38

Size of household: varies

Number of rooms: The parents have three rooms in their respective apartment.

2009–12

In 2009 the apartment next to their second-floor unit becomes available and the mother decides to buy it. This allows the household to arrange a semi-detached apartment suite with separate parents' units on either side and the children's rooms centrally positioned with connection to both parents (Figure 39). By locking doors on one side, the parents' units are alternately linked to the children's rooms. This solution does not have the noise problem they experienced in the previous arrangement with the staircase.

Lars about further adaptations:

But then the apartment next to this one in the second stairwell went up for sale. It was itself a merger of a one-bedroom and a studio. That apartment is a little different on the end of the building. So the kids' mom bought it, and I put up a third of the cost, and we remodeled yet again by adding new doors. We opened between the apartments and put in sound-rated heavy doors. [...] So it was pretty smooth that [the kids] could keep their rooms and didn't have to move out.

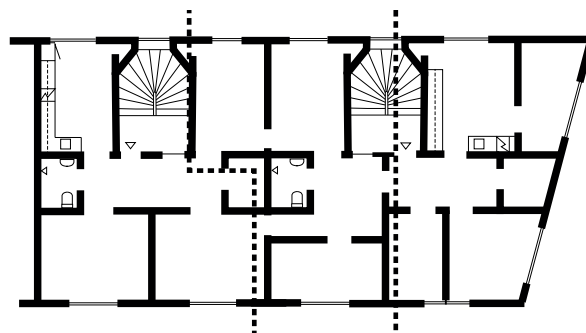


FIGURE 39

Size of household: varies

Number of rooms: The parents have three, respective two rooms. The children's rooms are located in between their two apartments.

Year 2013–2016

When the two oldest teenagers move out 2013, the apartment being their rooms is refurbished (installing kitchen) and sold as an own unit. This means that the parents' apartments now are permanently divided (Figure 40). The teenager still living at home now take turns living every other week with his parents.

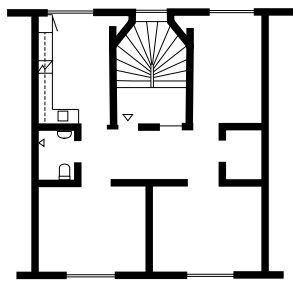


FIGURE 40

Size of household: 2, every other week.

Number of rooms: 3

The example shows a living process that spans twenty-seven years in which the household finds its own adaptable solutions to its spatial needs during the expanding and contracting sequence of family life. The original layout of the floor plan for the apartments, with its central corridors and the generality of the rooms allowing diverse uses, provides a good base for the changes in the apartment configurations (Figure 41 shows one of the rooms in Landshövdingehuset used as bedroom). On this foundation the households have developed a model for how to expand and contract the space of the home, making it elastic, even though this was not the originally intended spatial use.

From my interviews with residents, I can understand the adaptable-space culture as a type of dwelling culture, a project that empowers the residents. This project means residents share their ideas of expected spatial qualities with one another, and home renovation becomes a popular topic among neighbors in the block as different ideas are realized, discussed, and evaluated. From this perspective, adaptability can be seen as a do-it-yourself residents' project, a permissive laboratory for spatial use in which the households can find their own ways of adapting the space of the home.



FIGURE 41 One of the rooms in Landshövdingehuset used as bedroom.

4.3.6.3 Landshövdingehuset: spatial diagram: Generality

The other example from Landshövdingehuset offers a rare example of a household occupied by an 83-year-old woman who has lived there her entire life. She grew up in the apartment with her parents and her sister and later also lived here with her own family and her mother. After some time she divorced, and when the child became a teenager and moved away from home she lived with her mother in the apartment. Today she lives alone. During this living process, the household has solved its spatial needs entirely within the original footprint of a one-bedroom apartment.

The spatial diagram below (Figure 42), portrays the apartment as an unchanged space through all the years despite spatial needs that have been acute in years when the family was at its biggest.

Present household: Jane, 83.

Apartment: 44 m²

Time in the apartment: 83 years

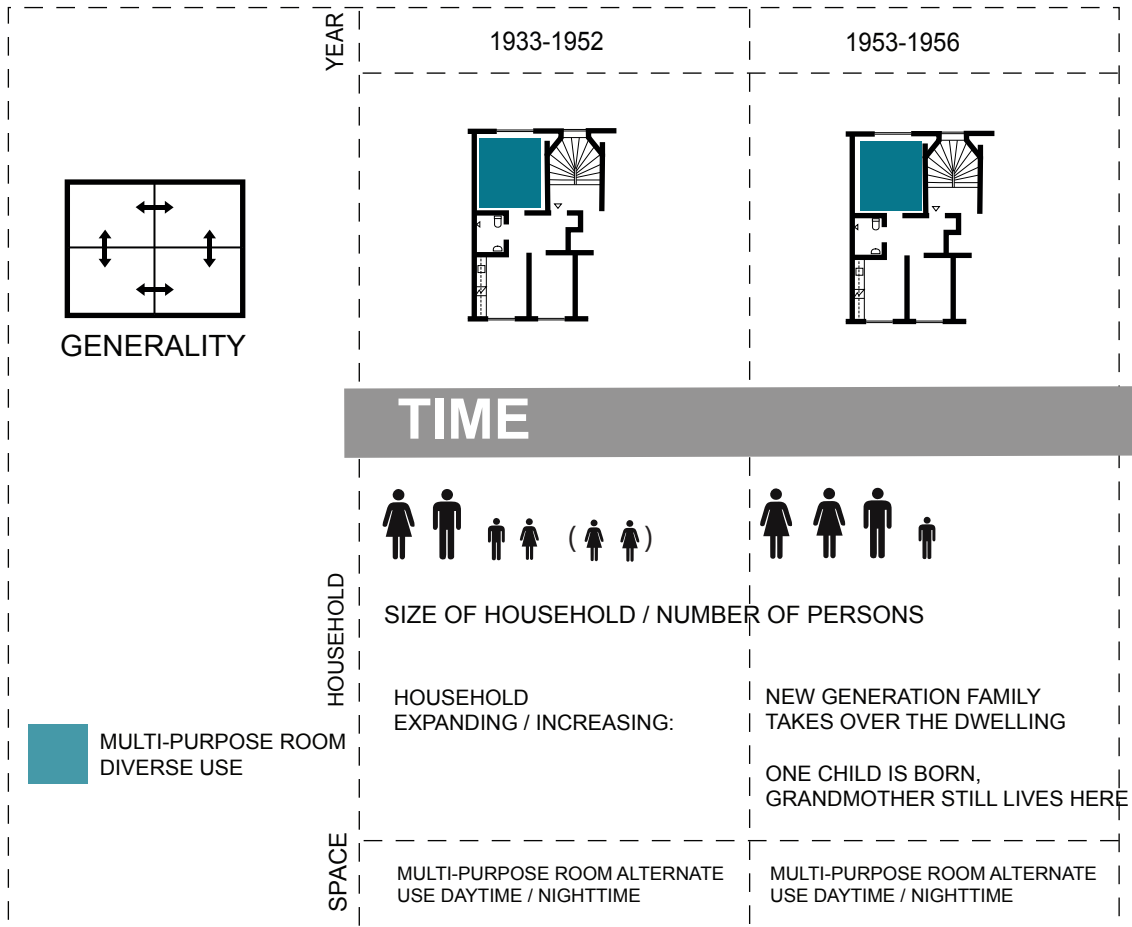
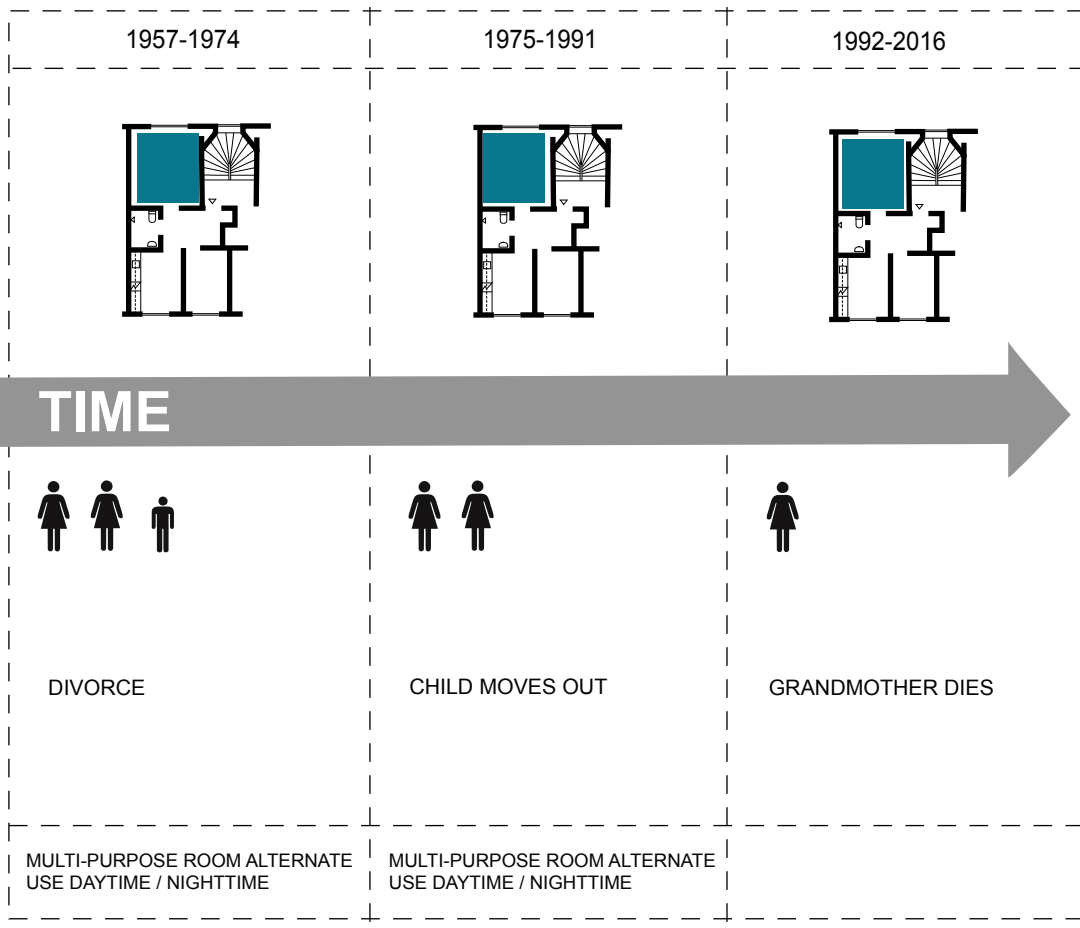


FIGURE 42 The household is during times crowded, and the apartment space is used alternately, for social gatherings in daytime, and for sleeping in nighttime.



4.3.6.4 *Landshövdingehuset: a second spatial narrative*

1933–52

Size of household: 4–6

Number of rooms: 2

The resident's parents buy this apartment when the building is new. She grows up here in a one-bedroom unit with her two parents and her older sister (Figure 43). During periods the household becomes larger when two young cousins come to live with the family. But this is not seen as a problem, and is resolved with the addition of some extra beds. For day-to-day life, the rooms in the apartment are used alternately for social activities during the day and as bedrooms at night. This spatial practice means that beds need to be unfolded and made up at bedtime, and that the position of some furniture changes from day to night.

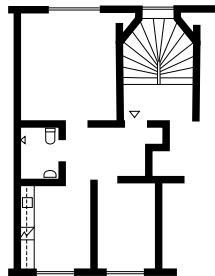


FIGURE 43 The rooms in the apartment are employed for diverse spatial needs through the years.

About how many they lived in the apartment.

Interviewer:

So there were four of you living here in the apartment?

Jane:

Yes, and even my mother's sister's children as well, because she became a widow, so her children lived here sometimes. [...] And then I guess she died after that, so they had to look after those kids, because later they ended up in an orphanage. That's how it was.

1953–56

Size of household: 4

Number of rooms: 2

Jane's father dies and some years later she marries. Due to difficulties finding an apartment of their own, she and her husband live in the unit with her mother. In 1953, Jane and her husband have a child. They intend to take over the apartment, and her mother plans to live with her sister. But after some time her mother gets sick, and when she is not in the hospital she stays with them in the apartment. Her husband is in the military, so he is also away periodically.

Jane:

At that time we set it up so when Mom was home she was in the living room and we [my husband, son, and I] had the bedroom. [My son] was little then, and he slept in a separate bed. And that is more than sixty years ago, so it's ... It was a different time then. You probably wouldn't do it the same way today.

They made up a bed for her mother on the sofa:

Yes, exactly: right here on the sofa. But she was in the country a lot: she would spend time at her sister's. Because that was the idea, that she would live there. So really we had the place to ourselves mostly—as long as I was at home. I was working then, too, but then she would be here because she would look after the boy when he was little.

1957–74

Size of household: 3

Number of rooms: 2

She divorces and now lives in the apartment with her son and her mother. When I comment on how many people have lived in the apartment at once, she responds that she does not consider that very crowded.

Jane About how many people lived in the apartment at once:

Yes, it's a lot, and there were five or six people living in a studio apartment over here when I was growing up. There were three,

four kids in an apartment there, and I thought we had a big place—we had a one-bedroom, you know—we had plenty of space her [laughs].

1975–91

Size of household: 2

Number of rooms: 2

The son moves out and Jane lives alone in the apartment most of the time, as her mother spends most time on the hospital.

Jane about her mother:

She was old then, but she got sick after that so that ... well, I had her here, and I was working of course, so she had to be admitted to the hospital and ... and so it went on that way.

1992–2016

Size of household: 1

Number of rooms: 2

Her mother dies and she lives alone in the apartment.

This example reveals a totally different approach to spatial use than the previous example. It shows a process of using the space in the home over the course of 83 years in which the household addresses its spatial needs during the expanding and contracting sequence of family life entirely within the original apartment footprint. The layout of the floor plan features general rooms that have been used as both bedrooms and living rooms, for social life during the day and for sleep at night. The living situation has many times been crowded, but it appears to have been a natural situation for this woman. Her attitude toward spatial use reflects the way we used to live in Sweden before the rapid rise in housing standards. Jane cannot see the benefits of the dwelling culture that dominates attitudes in the block today, with expanding and contracting apartment space; she finds this a strange way to use space. She appears to be convinced that to refurbish and expand or contract the apartment space is “not the right thing to do.”

The two disparate spatial narratives from Landshövdingehuset can be seen as illustrative of Sweden’s rising housing standards, whose norms for

crowding have had an impact on how we live today. Norm III for crowding, which prescribes one room for each member of the household and one shared room for couples, has made a strong impact that can be read in the spatial narratives presented in this chapter. The example Jane's life in the building exemplifies how space was commonly used before the rise in housing standards.

4.4 SUMMARY OF STUDY 3, LIVING PROCESSES

The findings from Study 3, Living processes offer answers to the questions of how adaptable apartments can support a household's need for living space over a longer time span, how households conceive of adaptable apartment space, and what living situations can be resolved with adaptable solutions.

4.4.1 Spatial needs and social preferences in the family life course situation

Adaptable apartments can allow residents to expand and contract their homes, or to create additional rooms within the confines of the existing apartment. That is a major benefit for households in the family life course, especially those who want to stay in the same neighborhood while their children are growing up. Social interaction, cohesion, safety, and continuity are some of the social dimensions that become accentuated and are critical to attain for these households.

The study suggests that staying in the apartment and adapting the space of the home to emerging spatial needs, even when this means a crowded situation, is a priority for residents due to the social benefits of staying in the same neighborhood. The driving force for these spatial adaptations tends to be the desire to give each child his or her own room. In response to this desire, apartment space is adapted without regard to the original design's intended spatial use—the households use the space available in the apartment however they can to adapt to their changing spatial needs. In practice this means that both adaptable design solutions and do-it-yourself solutions are employed to address the situation.

The spatial solutions employed in Landshövdingehuset tend to empower the residents, enabling them to make their own choices, and this has become a topic of conversation among the residents, who discuss different ways of adapting their homes. Empowering residents to shape the space in their homes today also leads to planning for the future of living in the apartment, which means that long-term ideas of being part of the community can form.

As children move out and a household leaves behind the family life course time in life, its need for space declines. This can mean that the remaining members of the household either move out or stay on in an apartment that is suddenly too large. The study reveals that the ability to reduce the size of the apartment, whether by renting out a portion of it to a subtenant or by splitting it up into two or more units, is found to be valued by some of the interviewed households as a qualitative solution, and some of them have also taken advantage of that ability. This type of solution allows the household to stay in the same apartment, benefit from the social qualities of neighborhood continuity, and potentially even lower their housing costs by reducing the size of the home.

4.4.2 Households' conception of adaptable apartment space

The households I interviewed appear to have a strongly positive attitude to adaptable space. They believe it can confer benefits such as giving children rooms of their own, separating off an extra room that can be rented out (4.2.4, 4.3.4), and even giving residents the freedom to exercise control over the space in their homes. However, some households appear to not understand adaptable space; they find it strange and cannot see its qualities. They comment that it is strange to move walls (4.1.4) and that to renovating to change the apartment's layout results in strange solutions (4.3.4).

These households express that they do not know what adaptability is, and they appear to find it strange. Understanding what adaptability is, of course, is important in forming a positive opinion of it, and also to the possible employment of adaptable space strategies.

For residents who did make changes to their homes, whether the apartments were designed for adaptability or not, the amount of effort they invested in doing the work themselves varied. Many households in the Landshövdingehuset block have made major changes, meaning a comprehensive refurbishment, to adapt the apartment. They have made these efforts themselves or have hired a carpenter. They express excitement over the accomplishment while acknowledging what an undertaking it was. It is not clear whether they find this adaptability strategy to be too complicated and demanding, but they do appear to be pleased with the opportunity to take these measures and also aware of the freedom adaptability affords them to configure their homes themselves. The one household that changed its apartment in Experimenthuset mounted the wall panels both themselves and with help from a relative. These residents find this to be a realizable and even qualitative solution,

although it does not provide adequate sound insulation. In Additionshuset, the household has made continuous changes to the apartment space, building temporary solutions such as bunk bed partitions and foldable beds. They consider these to be workable solutions, but they also say that it would have been better if the property manager could have supplied a prefabricated wall panel for the small extra bedroom. In all, most households appear to hold positive opinions of adaptable solutions, and the three multi-family buildings in the study demonstrate disparate examples of how to adapt apartment space.

5 SOCIAL ASPECTS AND ADAPTABILITY

What are the qualities that make households want to stay and not move? The issue is complex. I will reflect upon this question more generally but also in relation to the issue of adaptable apartment space, recapitulating the results from the earlier study, Study 1, as well as from Study 3. The findings from these studies show that the apartment's adaptability has an impact on the social aspects of the living situation, both for the individual household and for the neighborhood. The ability to stay on in the same home forms a living process in which the spatial use of the apartment becomes a bottom-up incentive that may also make the neighborhood more attractive. The found relation between social qualities, the household's living process and the spatial adaptability of the home stresses the question of the current dwelling design and the socially and spatially expected durations (SED). The social qualities appear to be the foremost focus for the households, and the access of qualitative apartment space, -that is to move, becomes a secondary question.

Below I present the strong social motives that drive the living process for households in the family life course in order to understand some of the qualities attained. I will refer most to Study 3, and to Landshövdingehuset, as this example stands out. I discuss the households' empowerment, exemplified in the Landshövdingehuset, and also emphasize one downside of this vivid living process shown by the study to be salient.

5.1 THE REASONS FOR STAYING

Studies 1 and 3 show that eight of thirteen households with children wish to stay in the neighborhood to attain continuity and preserve social dimensions while the children are growing up, and for three of the remaining households this issue is not clear. In the interviews the courtyard space is seen as a critical quality, a central outdoor space for everyday meetings, social contacts, and gatherings.

Additionshuset: Jonas, 48, about the everyday life in the building:
It was only natural when we came home, if you picked up the kids when they were little, we'd often sit out there in the courtyard. So they wanted to run around in the courtyard, and whenever there

was another adult out there of course we'd get to talking. And then we already had friends here in the building from before. But there are a lot of people I've been able to get to know a little bit—you see each other in the courtyard and chat and check up on each other.

The social interaction and networks achieved contribute to continuity and social cohesion and also add to the feeling of security. Fischer & Malmberg (2001) emphasize that these social qualities can be strong incentives for not moving, as people with strong ties to other people, projects, and places are in general less prone to move (p. 368). However, the neighborhood qualities are not the only incentives for staying; having children, owning a house, being married, and being employed are conditions that constrain migration (Fischer & Malmberg, 2001, p. 358). The value of staying in the same place tends to increase over time as the advantages accumulate, also a factor leading to decreased migration over the life course (Fischer & Malmberg, 2001, p. 358). I find that this becomes salient in the living processes in Study 3: among the households who have lived there longest, one reason not to move is neighborhood continuity. One resident from Landshövdingehuset describes the process of slowly getting to know her neighbors, and notes that they eventually become more than just shallow acquaintances:

Landshövdingehuset: Mia, 49, about the social dimensions and moving or staying:

They're probably not any nicer than others, the people who live here; it's just that it's really pleasant to sit outside and be out there a lot. So you end up getting to know your neighbors a little more than usual. I think. So that's in the long run. But sometimes I've thought it might be good for me to move on and move somewhere else. But I'm just like—I just love it here. It's almost like this right here is the most important base I have in my life. And at the same time it seems like a natural human thing that you come to love a place. So I don't want to move away from here, that's how it is, but maybe it might be good for me if I did move.

Mia also expresses that the qualities of social interaction and the everyday life here have contributed to the bonds of affection she feels for the place.

The qualities of the close vicinity also come out in the interviews—the proximity to a specific shopping mall and relaxing in a nearby park's green

environment are qualities in the household's everyday life (4.1.5, 4.3.5). The cooperative daycare in the Landshövdingehuset courtyard also appears to be a local project that involves both children and parents. Their engagement enables them to affect the quality of their children's lives and helps form social ties among the households (4.3.5).

From the interviews in Study 3, adaptability in itself is also held up by residents as a critical quality, not only as the physical means that allows for them to stay, but as a quality that has enhanced the household's attachment to the apartment or building. In Experimenthuset, the apartments' adaptability is experienced as a unique and qualitative capacity, and even the households that haven't made use of that adaptability are fascinated by the potential (4.1.4). In Landshövdingehuset too, adaptability is an appreciated quality. The households that have gone through divorce and resolved their living situation without moving seem very grateful for the ability to create separate living situations here. I find that they appear to care for and be attached to the space that embodies this idea of spatial adaption—they have an attachment to the apartment or building itself (4.3.4). I find that the process of adapting space in Landshövdingehuset demonstrates user participation. I address this issue in my licentiate thesis, where it is one of Murphy's concepts in his framework for social sustainability (Braide Eriksson, 2016, pp. 27–29). The notion of user participation describes the household's ability to engage in the design of their own home space, attaining social aspects such as belonging, identity, and self-realization. Habraken speaks of this as the idea of the dwelling as a “possession of the occupant” (1972, pp. 14–17).

5.2 THE HOUSEHOLD EMPOWERMENT AND COMMUNITY QUALITIES

In Landshövdingehuset I found user participation being practiced as a way of life. Planning for the future living situation appears to be a frequent goal among households in the family life course, when great value is attached to the community as a safe and attractive place for their children to grow up. This applies not only to the households in Landshövdingehuset but to most of the households in Study 3. The ability to choose how and where to live seems to be important, although in the Landshövdingehuset example this becomes even more clear. Enabling the households to make plans for their future living based on the knowledge of their apartments' adaptability appears to be of great value and to contribute to the feeling of cohesion. The

households' ability to plan their own spaces and implement spatial changes themselves can in this context be seen as the residents' empowerment over their own homes:

Additionshuset: Jonas, 48:

So we have a plan. The room that is over there—if you think about how it could be changed, one option is to rent it out. So you'd put in the doors here again so they have access to the hallway and bath and kitchen, and then you can rent that room out because it's very separated over there. So that's a future solution if there are only two of us—that makes the rent more affordable.

Landshövdingehuset: Tanja, 38, planning and considering on expanding the apartment:

And then down the road we want to buy the studio apartment next door, and he's going to move because he's a young student. He's told us that: [he'll move] in a few years. But we're not left in the lurch here at all. So it's mostly about the kids, what they need ...

It appears they presume they will have additional space to dispose in a future living situation.

User participation can also be seen in the light of what Krokfors calls the creative dweller (2017, p. 210). She points out the resident's self-conditional use of space as a way to promote sociocultural sustainability. She also emphasizes that living processes that allow residents to form and adapt their own living space with creative solutions promote social wellbeing, and this can also contribute to sustainable development in the wider context of the neighborhood or urban district (2017, p. 210). I find a salient example for her arguments in the Landshövdingehuset community process. The freedom for individuals to make their own decisions on how to live also contribute to the community process in terms attaining and developing the social aspects involved (4.3.4, 4.3.5).

The question of how to expand or renovate their apartments appears to be a common topic that unites the households, and enabling them to make their own decisions about their living seems to spur a process of appropriation. In addition, the adaptability practiced here is self-informing: whereas reports from the Experimenthuset (Statens institut för byggnadsforskning, 1966; Andersson et al., 1988) suggest that residents were not well aware

that their homes were adaptable or how they could be adapted, awareness of adaptability appears to have been for Landshövdingehuset residents a normalized part of the life in the building on a collective level. I can see that, given the normalized adaptability living culture in the Landshövdingehuset example, user participation contributes to social qualities and to increased social sustainability dimensions, both on the individual household level and on the community level. The family life course households can achieve the qualities they air for and at the same time enhance the community social process.

When contemplating the current dwelling design with focus on specific functions and a static configuration as presented in 2.3, the above presented social qualities can be seen as not respected to any larger extent. The expected spatial duration (SED), represented in the dwelling design, does not regard the issue of adaptable space to enable the household's own choice of staying or moving, instead the household's moving makes a normalized expectation. This means that critical social qualities are neglected with the current dwelling design's lack of strategies for adaptability.

The Landshövdingehuset example also shows downsides, however: the elastic adaptable space that can become part of one apartment or another also challenges the boundaries inherent in the home. I will reflect upon this process below.

5.3 THE COMMUNITY OF CREATIVE DWELLING AND ONE DOWNSIDE

The kind of collective living process described above can be considered a culture of creative dwelling, a process that fosters community. The community that develops from the households' participation in their dwelling process can perhaps be seen as entirely positive, but it brings up questions of spatial use and the households' free choice and autonomy, both concerning the common courtyard space and the elastic apartment space. The community of creative dwelling among households with children can be seen as occupying and also dominating the outdoor common space, and the inclusion of a cooperative preschool in the courtyard amplifies the role of children. For households without children or reluctant to join the community, the community can be an inconvenience and the central common space can in this case be a place where it's not possible to feel comfortable. In the same way, the employment of elastic apartment space can be understood as a dominating culture that sets the rules for how to use space and threatens the autonomy of the individual home. The resident might not want a neighbor to add a

staircase that intrudes into the apartment, but feels social pressure to allow it. It can be uncomfortable to refuse such a spatial request. The resident below describes his reluctant neighbor, unwilling to agree to let go control of her own apartment space, although in the end she did agree:

Landshövdingehuset: Lars, 60, about adapting the apartment:
Yeah, I'd say she really was pretty reluctant. She wasn't super welcoming in the beginning, but I guess when I told her I'd give her three hundred bucks if she let me come in and do a little work in there. So in the end she took it. So we weren't exactly super close, I wouldn't say that. But I want to say I remember that I found out she was about to move, so I asked her if I could by the apartment, too.

It can happen that a household becomes so uncomfortable with the pressure to agree to spatial changes that they decide to move away, and that might have been what happened above.

The adaptability strategy of elastic space seen in Landshövdingehuset means that the households' own apartment space becomes part of a system that presupposes that this space can be sold. This can mean that the household can have difficulties guarding its own spatial interests, which in turn challenges its autonomy and the privacy of its space. A resident who does not sympathize with or want to take part in the constant flux of apartment space can become an inconvenience to others, but because this concerns the resident's own private apartment he or she may be emotionally effected as well, experiencing the conflict as a threat to the autonomy and privacy of the home. An example of this is the elderly woman who was not interested in taking part in the ongoing renovation process that was reshaping the building's apartments. She belongs to another tradition of how to use dwelling space. But her reaction can also be understood as discomfort with an experienced obligation to participate. She describes what she thinks of the elastic use of apartment space below, and also comments that she has been convinced to let a neighbor take over parts of her attic storage, a consequence of the expansion of apartments that eliminated other storage spaces. This further feeds her feelings of decreasing autonomy:

Landshövdingehuset: Jane, 83, about adapting the apartment:
Yes, I know that they've [combined the apartments]. They've taken away the bedroom and made the kitchen larger and so on, they did that. But I haven't actually been in there and seen how it came out. And then they've redone the attic now, too. [...] Yeah, so there's the stair up and stair down and ... I'm not sure what they did. It's both the ceiling and the wall or—what do you call it? The floor. I guess the thing is they think it's too small. Because they have several kids. But there used to be a lot of children here, and they had to live here anyway [laughs] ... So of course [...] and she has my storage space. Because, I don't know, she has no attic storage so she's supposed to share. I don't know ... , we had to go through and empty out the entire attic. But now she thought I had so little stuff up there that she ought to get some of [my space] up there. So now I'm trying to decide, I don't know, that seems dumb to go along with that. But then [her son] says, "You're never up there anyway." [...] No, I would never have done it, say [these other people] here. I guess I'm dumb to just go along with everything, and then it turns out like this.

It appears as though she did not want to give up her storage space but felt that she had to when the pressure from neighbors and from her son became too high.

The interviews also reveal that the tightly knit community does not appeal to everyone and that the dominant children-first profile of the building determines whether one belongs to the community or not. The two parents with small children now believe they not will fit in here after their children have grown up. They're thinking of moving somewhere else when the time comes:

Landshövdingehuset: Tanja, 38:
No, but I think I wouldn't keep living here if I didn't have kids. It's so connected with ... kids and the simplicity of the daycare.

Landshövdingehuset: John, 48:
We'll have to make way for other families with kids, I think. I guess it's sweet that they get a chance to come in and experience this greenery.

Interviewer:

So this environment, this place, is closely linked to the years with children?

Tanja, 38:

Yes, I think so because if ... we had lived here alone in this two-bedroom apartment and weren't able to have kids, for example ... it's so flavored by the kids in these courtyards with families, and then a few retirees that have lived here since the building was built, who live in their old studios and don't want to build them out or anything, they belong here too but they probably think there are really a lot of kids that have taken over the courtyards. So I would probably rather live where there weren't so many kids [if I didn't have my own].

The household above emphasizes that the whole city block and its spatial culture is characterized by the life of the families with children, and that they would not live here without children.

The comments from the households presented above show a critical downside to the creative dwelling community in Landshövdingehuset: households that don't sympathize with or take part in the tight-knit community might feel uncomfortable and insecure in such a situation. This reveals that how space is disposed, processed, and framed in an adaptable solution can be of great importance for social dimensions such as identity, safety, and social interaction and cohesion. The elastic concept, as it is practiced in Landshövdingehuset, results in an excluding dwelling process. This gives reason to reflect on how the adaptable concept frames the apartment space and on what the household perceives as safe and clear spatial boundaries.

6 ANALYZING SPATIAL ADAPTABILITY

I will here analyze three of the apartment examples presented in Chapter 4 and the spatial functions of the three adaptable strategies: generality, flexibility, and elasticity. My focus is on the apartments' ability to adapt over time and the feasibility of each strategy from the households' perspectives. I will also touch upon some design issues related to adaptable design. The analysis is based on the households' experiences and the spatial diagrams presented in Chapter 4 (4.1.6.1, 4.2.6.1 and 4.3.6.1). I finish the chapter with reflections on the spatial strategies and their accessibility.

6.1 THE FLEXIBILITY STRATEGY

With Experimenthuset (4.1) as the point of departure, some qualities of the flexibility strategy (Figure 44), are examined here. I will touch upon the high level of room configurations that can be generated by this adaptability type and its potential downside. I will also reflect on the need for the architect to set the frame for the adaptable design but empower the household to govern the use of its space. Lastly I will also discuss some of the feasibility issues related to this type of adaptability.

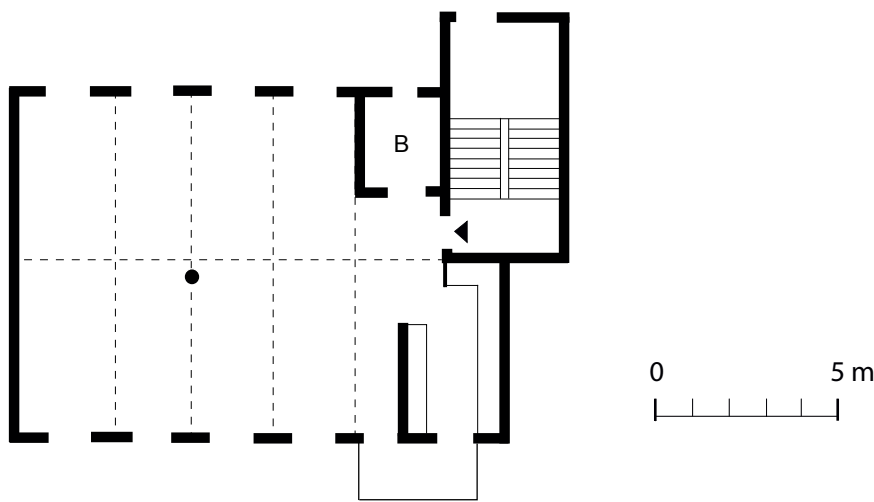


FIGURE 44

Flexibility

Enabling large spatial capacity

The risk of tight spatial design

Feasibility issues:

- an established information system
- feasible wall solution (install, relocate, sound transmission reduction)

6.1.1 Large spatial capacity and the risk for tight spatial design

The spatial capacity in this flexibility strategy generates a wide range of spatial floor plan schemes with the idea that the household can form the apartment itself. The floor plan's qualities, such as room sizes and possible room configurations, are set by the floor plan design, where the preset disposition of walls gives the household the free choice, within the preset disposition, to compose the floor plan to meet its spatial needs.

The households interviewed in Study 3 take only limited advantage of the adaptability provided, so the outcomes do not reflect the wide spatial capacity inherent in the design schemes. The earlier study on Experimenthuset from 1988 (Andersson et al.) shows that the households employed the flexibility more often when the building was new and that its use decreased over time (Andersson et al. pp. 48–49). The report presents the diverse spatial strategies practiced by the households in floor plans that give a fairly good representation of the capacity that flexibility allows. Some examples from the report are related below (Figure 45).

Even though the design facilitates a wide variation of floor plan dispositions, there is a downside to this flexibility strategy, according to the report on adaptable dwellings (Wiktorin, 1975). The report brings up the question of room sizes as a critical issue and finds that a flexible solution generally confers a risk for small, dysfunctional rooms because, since the outline of the unit is fixed, rooms can only be added to apartment by dividing others, and therefore increasing the number of rooms in the apartment can mean tight and insufficient floor plan solutions (pp. 17, 37–39).

When contemplating the households' use of adaptable space in Experimenthuset and how they have designed their homes, this finding is confirmed. The two reports on Experimenthuset (Statens institut för byggnadsforskning, 1966, p. 14; Andersson et al., 1988, pp. 29, 56–57) relate that the households preferred a spatially tight design with small rooms. They have to a large extent chosen to live with small bedrooms to facilitate a larger living room space. One question raised here is whether or not the households should have the opportunity to make their preferred choice. It is relevant to acknowledge that this type of flexible solution to some extent relegates to the household the decision of what spatial qualities the home will provide, as this is embedded in the strategy. To some extent, however, qualitative room sizes can be predetermined in the floor plan design, and are thus an issue for the architect to consider.

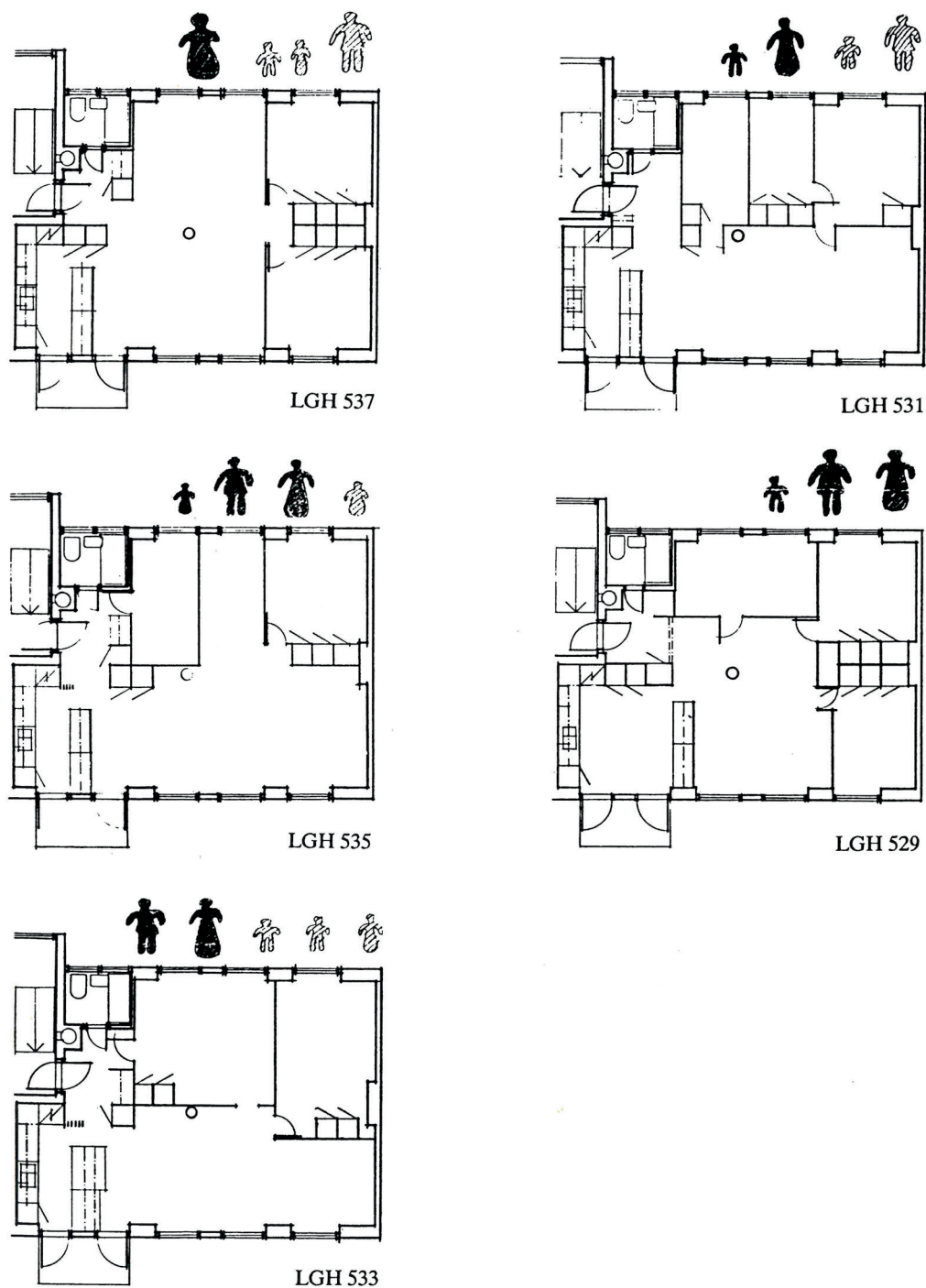


FIGURE 45 Experimenthuset, the wide range of floor plan dispositions. How space is used by five different households in the 72 m² apartment. The large room for social interaction at the expense of bedroom sizes makes a recurring disposition of the apartment space (Andersson et al., 1988).

6.1.2 *Feasibility and conditions for implementation*

In Study 3, two critical factors stand out when considering the feasibility of flexibility as an adaptability strategy: the information factor and the wall solution.

From the interviews I conducted with households in Experimenthuset, it became clear that the information on the building's adaptability had been weak or non-existent (4.1.4). For two of the households, it was very much unclear whether the adaptable system was still an option and, if so, how it worked. The wallpapered wall panels may have contributed to this uncertainty, since they looked like standard walls. This question of informing residents with the knowledge of how to employ the adaptability system is also examined in the two reports on Experimenthuset (Statens institut för byggnadsforskning, 1966; Andersson et al., 1988), where the information factor appears to have been neglected. The report from 1966 (Statens institut för byggnadsforskning) relates that the first set of households living in the apartments were informed by the architect himself, and there was no written information (brochure or the like) to hand over, and by the next generation of residents, understanding of the building's adaptability had already started to decrease (Statens institut för byggnadsforskning, 1966, p. 9). The other report relates that the households knew that the apartments were adaptable but there was no information from the property manager; instead, the information on how to proceed had been passed from one neighbor to another (Andersson et al., 1988, p. 50). The conclusion drawn in the second report is that information constitutes a critical factor for the employment of adaptable space, as the desire or need to adapt a space might never emerge with insufficient information (pp. 50–53).

The employment of adaptable space can also be affected by how feasible the wall solution is. From the interviews in Study 3, the household that used the movable wall panels was satisfied with the solution. They had installed the wall panels with the help of a relative and found that this operation was not difficult. Their only remark on the solution was that it did not adequately prevent sound transmission between rooms (4.1.4).

One of the reports on Experimenthuset (Andersson et al., 1988) relates a more nuanced picture. Here the movable wall panel issue appears to be critical and the households' reflections are both positive and negative (pp. 50–51, 62–65). When considering the question of installing the movable wall panels, there were different views on the feasibility. Five out of eleven households thought this had been a difficult operation, while two found it easy (p. 51).

The households had also used different strategies for the operation: some did the work themselves, while others had been helped by relatives or hired the property manager, Bostadsbolaget (p. 51).

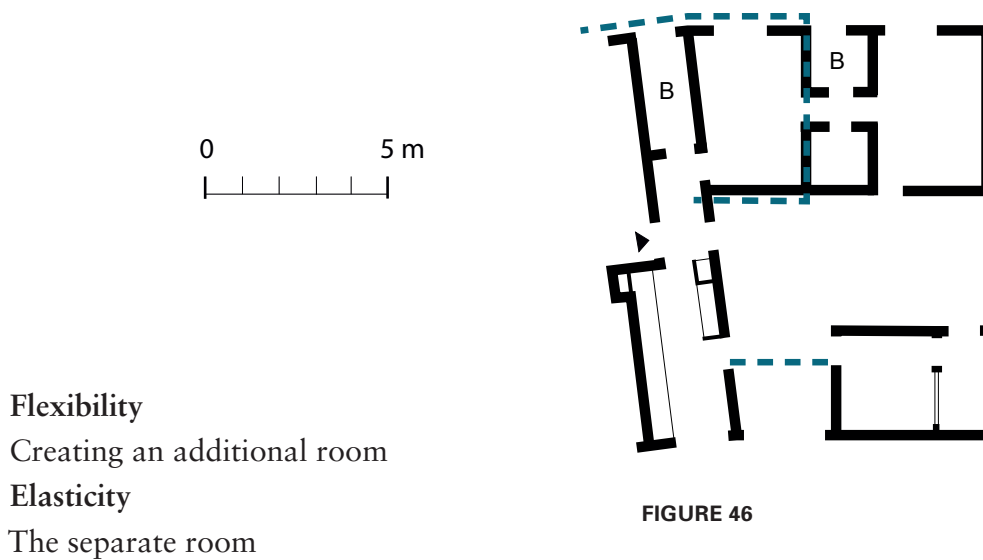
The appearance of the wall panels is also an issue brought up in one of the reports (Andersson et al., 1988). The panels have been designed as movable wall panels constructed of an insulated wooden frame with a surface of painted wallboard. The joints between the panels are designed to be visible, covered by wooden strips applied to the surface (p. 26). After a renovation in 1975, the joints were taped and the panels wallpapered over, which hid their potential mobility (p. 51). The painted panels' original appearance was not regarded as attractive among the households, while the new finish with wallpaper and hidden joints has complicated the installation and relocation of the panels (p. 52).

Another recurring question regarding the wall panels is the issue of noise reduction. In both reports, most of the households find the panels' sound transmission performance unsatisfactory (Statens institut för byggnadsforskning, 1966, p. 19; Andersson et al., 1988, p. 65). This issue also comes out in the interviews in Study 3: the household that has lived a long time in its apartment and used the wall panel system emphasized its poor performance in terms of sound transmission (4.1.4).

To summarize the discussion of the movable wall panel system, such a system needs to be feasible to construct and install, relatively easy to relocate, have a good finished appearance, and provide acceptable sound transmission performance.

6.2 THE FLEXIBILITY AND ELASTICITY STRATEGIES

With the example of Additionshuset as a point of departure, some qualities of the flexibility and elasticity strategies will be discussed here (Figure 46). I will touch upon the different features these two strategies provide and discuss the issue of creating an extra room in the apartment.



6.2.1 Flexibility: providing for an extra room

The flexibility and elasticity strategies facilitate different qualities in the apartment in the Additionshuset example. The flexibility strategy enables residents to create an extra room in the apartment, while the elasticity strategy facilitates a more private situation for a part of the apartment that can be used by a teenager in the family, for example, or it can be rented out to lower the household's living expenses. How have these adaptable strategies worked?

The flexibility strategy of creating extra room within the apartment has not been the household's first choice when needing space. The spatial diagram (4.2.6.1) shows how the living process has meant the continuous creation of additional rooms in locations of varying quality within the apartment, often without daylight. The reason for not creating an extra room right from the start is not clear. It may be because the existing space offers a convenient and appreciated location for the dinner table, or it may be because the spaces resulting from the division are too small to be truly functional (approximately 6 m²). Would this room have been the initial choice if it could have been larger or if the floor plan had been laid out differently?

Perhaps, if the added room could have had a more usable size, it might have been added from the beginning, sparing the household the inconvenience of reconstruction and making their living situation easier over a significant amount of time. This suggests that the utility of the flexible strategy of creating an additional room depends on the size of the original space and can have a major influence on living qualities for a household over many years.

Examples where the additional room is more usable due to size and position can be seen in God bostad from 1976 (Bostadsstyrelsen), in which examples of this type of flexibility strategy are presented. Here the additional room can often be reached from a neutral space (hallway) and multiple potential locations for doorways also contribute to the changed room configurations, one example of this is presented in 2.2.4, Figure 8.

6.2.2 Elasticity: creating a separate room or separate unit

In contrast to flexibility, the elasticity strategy has been working well for many years as a means of creating a separate room for the teenagers in the household. This room is well positioned by the entrance and lets whoever lives here sneak in and out without interfering with the rest of the apartment space (Figure 46). This use of elasticity to provide a more private part of the apartment for teenagers, for example, or for renting out also appears to be how many of the households in Study 3 conceive of this type of space (4.2.4, 4.3.4) (this type of separate room is found in both *Additionshuset* and *Landshövdingehuset*). The elasticity strategy demands little more than a strategic floor plan design with a tight room-hallway-bathroom-kitchen arrangement, but it can be a valued asset that expands the qualities of spatial use in the apartment.

6.3 THE GENERALITY AND ELASTICITY STRATEGIES

With departure from the example in Landshövdingehuset, some qualities of the generality and elasticity strategies are discussed here (Figure 43). I will touch upon the generality strategy and its capacity to provide space for shifting uses without physical modifications to the apartment, and then discuss the elasticity strategy's capacity as exemplified by the floor plan of Landshövdingehuset. Lastly I will also discuss the feasibility of this strategy.

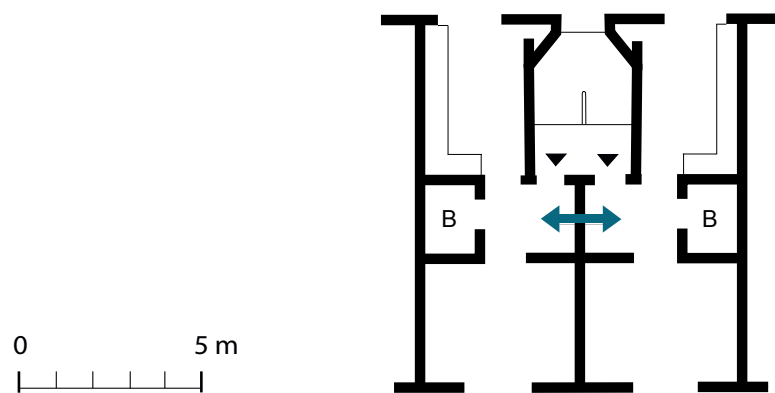


FIGURE 47

Generality

Enabling diverse use of rooms and supporting the elasticity strategy

Elasticity

A clever spatial structure enabling the extension of apartment space

6.3.1 *Spatial qualities*

The spatial capacity of the generality strategy is reflected in the varied use of the rooms in the example. As the households expand or contract their living space, the rooms can be put to a variety of different uses in the shifting floor plan configurations (Figure 48).

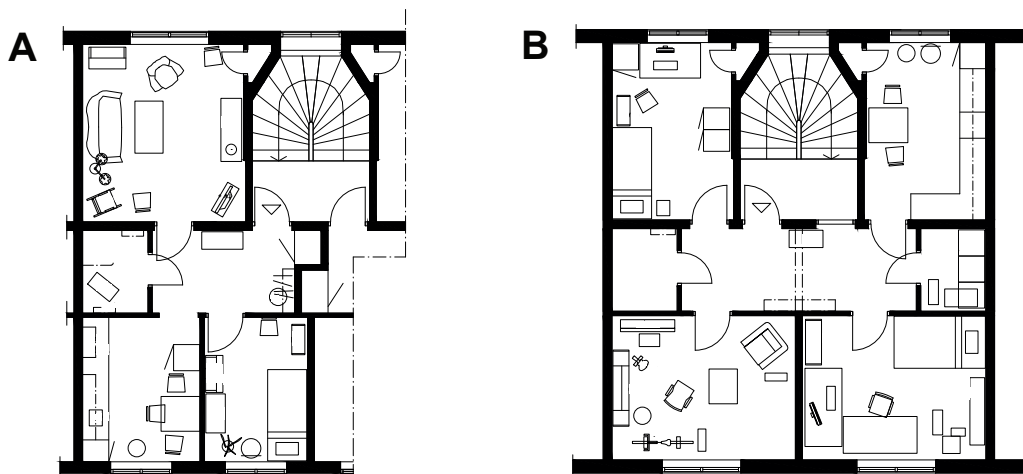
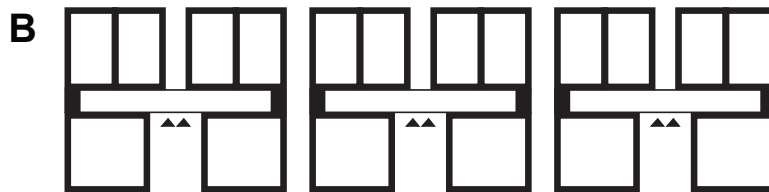
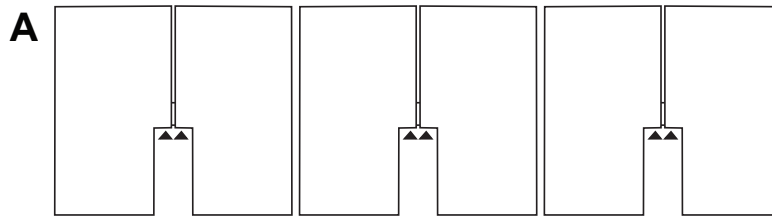


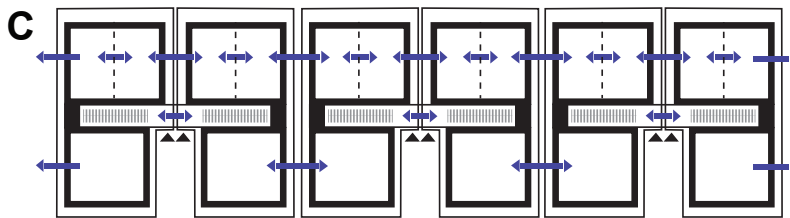
FIGURE 48 Generality strategy, meaning that the rooms have a size that can be used for multi-purposes, and that they are interchangeable. In the two apartments A and B, the furnishing display the diverse use of the rooms.

An apartment that employs only the generality strategy, with rooms that can support diverse uses, does not require any physical changes. It is a highly feasible strategy in that it is more or less ready to use at any time. This also means that it is less resource-demanding than adaptable strategies that require some sort of physical intervention such as refurbishment. In this context, generality must be understood as a sustainable strategy in the long term, one that makes adaptability a permanent feature of the home (Manum, 2006, p. 52).

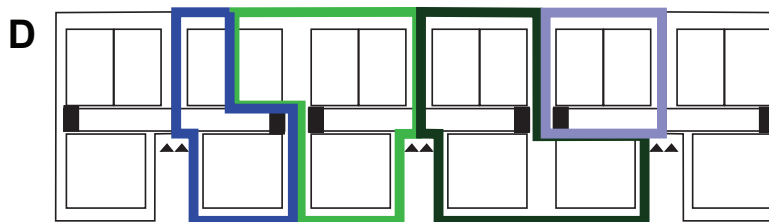
Spatial elasticity, however, with the growing-contracting spatial process illustrated in the example, implies both small and large physical interventions as the rooms and apartments are linked or cropped off. The floor plan configuration in Landshövdingehuset allows a clever and qualitative extension of apartment space even though this was not the originally intended spatial use (Figure 49).



A, B. The precondition with two apartment units per stairwell and a central hallway with entrance and access to all rooms establishes the structure.



C. Spatial connections within apartments and between apartments can be made either through the hallway or between rooms.



D. The spatial composition allows for apartments with many different sizes and diverse spatial combinations. The generality allows for shifting the use of space when changing the apartment layout.

FIGURE 49 The spatial structure of Landshövdingehuset allows for an extensive elasticity (the figure does not show vertical elasticity).

6.3.2 *Feasibility and conditions for implementation*

The capacity for this type of adaptable strategy to provide spatial solutions can be considered extensive, but in terms of feasibility it can be seen as demanding. I will here address four issues that become salient with the Landshövdingehuset example.

First, the adaptable model for Landshövdingehuset depends on the purchase of space, and both the initial apartment investment and the expansion of apartment space constitute expenses for the household. This whole model limits the availability of this type of adaptability strategy to well-funded households. It can also mean that even households that already live in the building but lack the means to buy additional apartment space can be left out of the adaptability community.

A second issue identified in the example is the realization of the project adapting space. The process involves contacting the effected neighbors and reaching an agreement on spatial change, which might be complicated in some situations. The process also involves physically altering the building, which involves carpentry and possibly also structural, plumbing, and electrical work. This can be seen as complicated and infeasible for some households and as very feasible for others that might even do the work themselves.

Third, the building's construction and materials are a salient issue for a strategy that involves recurring comprehensive refurbishments. The building's load-bearing structure needs to accommodate the adaptations and the building materials need to be relatively easy to work with, preferably so that the households can manage the refurbishment themselves.

A fourth and final issue is that mechanical-electrical-plumbing systems need to be addressed for this type of redistribution of apartment space. Today's building code requirements for mechanical systems in multi-family residential buildings are comprehensive, and older apartments may not satisfy today's regulations in terms of air supply, for example, or sound-proofing or fire safety. Reconfigurations of the type made in Experimenthuset require the resulting units to meet today's code, which may require modifications to mechanical systems that can dramatically increase the construction cost.

Taken together, these feasibility issues mean that this type of adaptable building presents a huge challenge in many ways. At the same time, the benefits of adaptability can be large when considering the many spatial alternatives and the empowerment it can provide for the household.

6.4 ACCESSIBILITY TO ADAPTABILITY

I will conclude this chapter by addressing the question of accessibility. The examples above can be examined in terms of how accessible the adaptability is for the household—how easy the employment of adaptable space is, and how accessible in terms of cost from a household perspective. The issue of accessibility is critical and multifaceted, and also touches upon the question of equity, and I find it a key subject for the implementation of adaptable apartment solutions.

Two questions related to the issue of accessibility are how feasible the adaptable strategy is to implement, and how expensive it is for the particular household. A flexible solution in which prefabricated wall panels or on-site constructed walls are used requires the skill to handle and rig the wall panels or to construct the walls. Even though a wall panel system is designed for ease of installation and relocation, there are still households that can find this a complicated operation. For a household not capable of handling the wall system or constructing the wall on site, adaptability might seem unattainable. This can easily determine whether the system is implemented or not, or whether the intended quality becomes excluding to some. On the other hand, the panel rigging or wall constructing can be solved with some help from relatives, friends, or a hired carpenter. The possible costs related to this work, however, can add to the household's living expenses, and can thus mean decreased accessibility for households with limited economic resources.

The three examples above (6.1, 6.2, 6.3) respond in different ways to these issues of accessibility. The flexibility example in Experimenthuset (6.1) seems to allow the household fairly free disposition of floor plan, including size and number of rooms, but how accessible is this solution in terms of ease of implementation and cost? The flexibility strategy relies on the movable wall panels that are designed to facilitate easy change in the layout. In Study 3, the household that made use of the system emphasizes that it is easy to implement, but one of the reports on Experimenthuset indicates that almost half of the households surveyed said that handling the wall panels was difficult (Andersson et al., 1988, p. 51). This shows how difficult this question is: some households have the skill to handle the wall system, and for others it is so difficult it might not work at all. The initial cost of the wall panel system and possible need for help with manipulating it is yet another question when contemplating the accessibility. The cost needs to be manageable for all households to not become an exclusive quality.

The flexibility and elasticity strategies in *Additionshuset* (6.2) offer quite a different example. Here adaptability does not imply the household's free disposition of space in the same way, and the example can be seen as more spatially delimited. The two separate adaptability concepts are part of a conventional floor plan solution and can be implemented in different ways with varying feasibility. In the elastic strategy, the separate room (with connection to entrance, bath, and kitchen), does not imply physical intervention, and has no additional costs. In the interviews, this room is regarded as a huge quality, both as a space for a teenager and as a possible space to rent out (4.2.1–4.2.6). The flexibility strategy, however, raises more questions of accessibility. In our example, the flexibility is limited to one room, and a new wall is needed to supply an additional room. The wall can either be built on site or a prefabricated wall panel system. In either case, a certain amount of skill is needed either within the household or from a hired hand. The site-constructed wall in this case is likely to demand a larger effort from whoever does the construction, while the wall panel system needs less effort. A prefab wall panel solution that is easy to handle can announce the available adaptability and lower the household's threshold to implementation. The cost for construction and maintenance of wall panels in this example is lower than in the *Experimenthuset* example, as this solution involves one single wall.

The generality and elasticity strategies exemplified in *Landshövdingehuset* (6.3) constitute a rare example and pose some relevant questions about accessibility. Although the spatial rearrangements can be considered demanding, these strategies are frequently employed by the households. The elasticity strategy means that the household has a wide range of spatial opportunities and can make its own preferred apartment design, but these spatial arrangements are conditioned and limited by agreements with neighbors. If the household in question has difficulties in communicating with or coming to an agreement with the effected neighbors, or if the neighbor needs the space, it can be impossible to make the spatial changes. The physical arrangements needed to accomplish the spatial adaptations are also substantial, such as new openings in walls or the floor structure. This means that either the household needs to possess the carpentry skill themselves or they need to hire someone. The likelihood that a household has the required skill may have changed since the construction of *Experimenthuset*, however, as do-it-yourself home renovation is becoming increasingly common, and as the materials and tools needed have improved.

When considering the costs of adapting the home, buying an adjacent space and refurbishing the apartment confers a substantial expense for the household. The added complication of having to negotiate an agreement with neighbors and the costs related to the adaptation of apartment space suggests that this adaptable strategy is available to households that are successful in neighbor communications and have the money to buy and refurbish the apartment space. In this context, the example can be understood as excluding some residents. By contrast, the apartment's other adaptability strategy, general interchangeable rooms, does not require physical intervention and confers no additional costs. These general rooms are also frequently used for different tasks, such as sleeping, social gathering, working, and so on.

A summary, we can conclude that the adaptability strategies that require no spatial intervention (the more separate room in *Additionshuset* and the general-sized room in *Landshövdingehuset*) are the most accessible, and also the most equitable, as these demand no economic or personal strength to employ. And yet these cannot provide the same spatial solutions as the ones that require some type of refurbishment. The different adaptability strategies all supply different qualities and are accessible to differing degrees. However, it is critical to understand the excluding effect one adaptability strategy can have when considering the issue of accessibility.

There is one more issue that must be addressed when discussing accessibility in the apartment examples in Study 3: the household's possibility to adapt and refurbish the home differs between rental and owner-occupied condominium apartments. The tenant in the rental apartment is generally not allowed to refurbish or to make comprehensive spatial changes to the apartment, while the apartment owner in a condominium is allowed to do rather substantial refurbishments. The extended spatial use practiced in *Landshövdingehuset* would not have been possible if this was rental apartments. Today rental apartments constitute 40% of all apartments in multi-family residential buildings (SCB, 2019b). This means that a large portion of the households living in apartments have limited possibilities to make spatial changes in their homes, an issue that can be regarded from an equity perspective. This, I can see, constitutes a critical question: can adaptable strategies involving changes to spatial conditions become more generally practiced in rental apartments? As the system works now, apartment ownership means more access to adaptable space.

7 DISCUSSION

This discussion recapitulates the whole thesis and revolves around two issues. One issue is the context for adaptable space, and concerns how the social aspects found to be related to adaptable apartment space can be understood as qualities not only for the family life course household but from a general living process context. The other issue concerns how the household's living process and life course situation is a precondition for its spatial needs—that can be seen as challenge to the current focus of contemporary apartment design.

7.1 ADAPTABLE SPACE: WHAT SOCIAL QUALITIES, AND IS IT USED?

7.1.1 *Recapitulating the research*

During the research process, my work came to focus on the questions of the social dimensions related to adaptable apartment space, the household's living process with spatial use over time, and the life course situation. As these questions were closely related to the empirical studies, rather than all-inclusive theories, the theoretical approach applied was similar to Merton's concept of Middle range theory (1949). The theoretical framework for the thesis was thereby formed with, a concept for adaptable space (1.3.1, 1.3.2), the household's living process illustrated through the time-space model (1.4), Murphy's framework for social sustainability (1.4), and Merton's SED concept (2.3.3).

The first two studies of the research Studies 1 and 2, introduced the issue of adaptable apartment space and social sustainability aspects from a broader perspective. I investigated the ways in which adaptable space relates to social dimensions, and how social sustainability aspects can become a salient component in the work with apartment floor plan design. In Study 1: Social dimensions, I used Murphy's framework for social sustainability and empirical studies (Braide Eriksson, 2016, pp. 27–30, 32–36) (3.2.1), and in Study 2: Research by design, I worked with floor plan design through Master of Architecture student studio work (Braide Eriksson, 2016, p. 37) (3.2.2). Both of these studies showed that the living process with the household's spatial use over a longer time span was a relevant factor for the social aspects involved. Study 3 thus continued with the household's living process and

narrowed down the issue, to discuss qualities of apartment space. Empirical studies and the time-space model were used, together with a concept with strategies for adaptable space, to investigate the household's spatial use during the family life course situation with the expanding and contracting of the household (3.2.3). The question of the household's living process was understood from Merton's SED concept with socially expected durations (1984) (2.3.3), but the living process was also understood from, and related to, the current apartment design and its background to understand how this issue had been processed earlier.

Study 3 explores several social aspects related to the apartment's adaptability. These can be seen as critical qualities from a living process perspective for the particular household, but are also relevant in the context of a broader understanding of the relevance these have for the residential community. Many of the qualities found in Study 3 also tie back to the framework used in Study 1, with Murphy's four dimensions (Braide Eriksson, 2016, pp. 27–30).

7.1.2 Adaptable space: the dimensions of social sustainability

When recapitulating the thesis and contemplating the social aspects found related to adaptable space, there is reason to come back to Murphy's framework for social sustainability from Study 1, with the four social dimensions of equity, social cohesion, user participation, and awareness of sustainability (Murphy, 2012) (Braide Eriksson, 2016, pp. 26–30). The two empirical studies performed in this thesis present findings that relate to these four.

From Study 1, two of the four dimensions were salient: equity and social cohesion (Braide Eriksson, 2016, pp. 79–80). The equity dimension stood out, as adaptable space can make a significant difference attaining critical social aspects for households with limited economic resources (Braide Eriksson, 2016, p. 79). For a crowded household in need of another room but without the economic means to move to a larger apartment, the possibility of creating an additional room in their apartment can be a valuable quality, as overcrowding not only results in practical consequences but also can affect both physical and mental health (SOU, 1986, pp. 47–48). The independent room here is a key question, as it can provide space for recreation, privacy, or work and homework. A household that is crowded in terms of number of rooms can therefore be worse off than one crowded in terms of area.

The second dimension, social cohesion, concerns the household's changing spatial needs and the ability to adapt the apartment space to allow them to stay in order to attain social aspects in the neighborhood (Braide Eriks-

son, 2016, p. 80). For a crowded household in need of another room and wanting to stay in the neighborhood, adaptability can be a valuable quality. The household's strong relationship to the neighborhood's social qualities is also found in Study 3 (5.1).

The third dimension, user participation, is showed in Study 3 in the Landshövdingehuset example. The households could here adapt their own apartment space in extensive ways and experienced a great sense of freedom (4.3.3, 4.3.4). This spatial freedom allowed for future planning of their living process, fostering engagement in the neighborhood and enjoyment of the related social dimensions, including social cohesion, safety, and identity (4.3.5). The process of adapting apartment space also became part of the community process, increasing the social cohesion dimension (5.2). There was also a downside to this adaptability process, as the strong community also became excluding for some households, leading to unsafe situations in which households even perceived the space of their homes as threatened (5.3).

The fourth dimension, awareness of sustainability, also became salient in Study 3. The awareness dimension can be related to communication and knowledge of the adaptable strategies supplied, and thereby links to the household's wish and potential to act sustainably. This issue is not limited to households; Beisi emphasizes that architects, building owners, and households need to communicate with one another for the adaptability to be fully utilized (Beisi, 1995, p. 155). In the report on Experimenthuset, the relevance of knowledge and information is also emphasized as one issue affecting the households' employment of adaptability (Andersson et al., 1988, pp. 48–49). The issue of the households' knowledge and information regarding adaptable space comes out in Study 3. In Experimenthuset some of the households don't know what an adaptable apartment is, if the adaptability is still in use, or how to employ the facility (4.1.4). In Landshövdingehuset one household (the elderly woman) expresses that her neighbors' continuous spatial adaptations are something strange, and do not result in good design solutions (4.1.4, 4.3.4). The household's knowledge of the qualities of this adaptability, the spatial possibilities it can provide, and how to employ it constitute a critical factor for the employment of adaptability. It is not likely that a household that doesn't know how to operate the adaptable strategy will go ahead and try to implement it; what is perceived as unclear or complicated can easily become uninteresting and thereby unused.

Recapitulating the research and contemplating the social aspects found related to adaptable space, these social aspects appear to be several, and of

significant importance for the household, covering all four dimensions of the social sustainability framework.

7.1.3 Adaptable space: a context dependent concept

The social aspects discussed above are related to the household's ability to adapt the space of their own apartment, but how generally applicable are these findings? Does the need or desire for adaptable space identified in the research, with the related social dimensions, apply to households other than those in the family life course?

The research finds that certain situations drive the household's demand for spatial changes and spatial interaction: overcrowding, the need or desire to reduce housing cost (by renting out a room or reducing the size of the apartment), the desire to participate in the local community, and the desire to engage in their own home space and to be able to plan for the living situation ahead. I find that these desires are not limited to the family life course, but are common to a more general group of households.

Among those living in multi-family residential buildings, overcrowding is more common among households with a foreign background (34%) or a single parent (41%) (SCB, 2019a). But among all households in multi-family residential buildings, 16% are overcrowded, which means that many households live with limited space.

The desire to reduce living expenses can be seen as an issue that applies to many households, but the solution of renting out a room might be unthinkable to some. For some households, though, reducing living expenses can be critical to getting by, while for others it can be a way to realize life projects. The parent in Landshövdingehuset can realize her dream of working as an artist by decreasing her housing cost (4.3.4).

The desire to participate in the local community can motivate households to remain a longer time in the same neighborhood. Fischer and Malmberg emphasize that people with strong ties to other people, projects, and places are less prone to move (Fischer & Malmberg, 2001, pp. 368–369). This often applies to households in the family life course (having children, owning a house, being married, and being employed), but it can apply to others as well (Fischer & Malmberg, 2001, pp. 368–369). Households with elderly members and those that value continuity and established social networks are examples of households that are less prone to moving. The desire to plan for the household's living situation, I can see, is common to many kinds of households, as this issue concerns vital social aspects. The ability

to plan ahead contributes to the feeling of security, both psychologically and economically—knowing what lies ahead, that the housing situation can work even with changing spatial conditions, and that those changes won't impact the cost of living to any larger extent can be critical qualities. Planning ahead also spurs identification with the place.

The qualities related above are social aspects that speak to many households and living situations, though they can be seen as most urgent for those with limited economic means. The ability to alleviate overcrowding or to rent out to reduce living expenses, and the ability to plan ahead to secure housing qualities and affordability, are most important to households of limited means as they have fewer alternatives. Adaptability therefore has a significant equity aspect, even though many different types of households live in situations that would benefit from adaptability.

Nevertheless, adapting the layout of the apartment might not be the best way to accommodate a changed living situation. The need to physically alter the space of the home, to refurbish or to employ the adaptability strategy provided, may be seen as too complicated, as was discussed with the issue of accessibility (6.4). Many living situations also function well without needing to adapt the apartment space. The household might not be crowded, or might have the needed space to expand. They may not need to rent out a room for economic reasons, and may not want a tenant. Engaging in the local community, developing relationships with neighbors, and other social qualities might be of secondary value. Working life and career might be prioritized instead, and when the living situation changes, moving may be seen as more attractive than commuting. The living situation might be considered less important, so planning for it may not be a priority. Adaptable apartment space is thus not universally applicable to every living process; instead it is contextual: it can supply the needed space and contribute to the attainment of social aspects in a living process in one case, but in another case adaptability may not be enough to respond to the spatial needs, and in yet a third case it might be left unemployed.

7.2 THE HOUSEHOLD'S LIVING PROCESS: A BOTTOM-UP REALITY

How can the issue of adaptable apartments be understood in relation to current design practice? My research findings suggest that apartment design today uses a top-down perspective, and that one outcome of that approach is that social dimensions and the longevity of the housing stock are neglected.

This thesis shows that a household's living process and life course situation affects its spatial desires and needs, and the households studied have responded by making spatial arrangements regardless of whether the design provides adaptability or not. These arrangements differ. The household in Experimenthuset has used the supplied wall panel system as intended (4.1.3), and the household in Additionshuset has made its own spatial arrangements to meet its spatial needs (4.2.3). The households in Landshövdingehuset show two ways to meet the changed spatial needs (4.3.3), the elderly woman by using the multi-purpose rooms differently during the day and at night, and other households have found their own spatial strategies, not intended in the original design, for increasing or decreasing the space of the apartment. The households all follow their need and desire to rearrange their space, and what could be described as an *adaptamentality* (my own term. cf. "governmentality", Rose, O'Malley & Valverde, 2009) appears to be a natural mindset. These consequently implemented realizations of spatial changes in response to the living process and life course situation suggest a strong bottom-up tendency.

The households' spatial rearrangements due to the living process and life course situation can also be related to what Baum and Hassan call "non-mover renovators" (Baum & Hassan, 1999, p. 23). They emphasize that household size and household type are significantly related to the decision to renovate the home. In their study, larger households and households with children tended to undertake renovations more often than other households (Baum & Hassan, 1999, p. 31), which suggests that a household's living process and life course situation (expanding and contracting) can be one factor affecting the rearranging of space. Femenias et al. (2016) also explore how households change their living space. They found that households renovate their apartment space by refurbishing bathrooms, adding cooking islands, and rearranging how rooms are connected, but also by changing the number of rooms in the apartments, both adding rooms (often in households with growing children) and subtracting rooms to get a more spacious apartment (Femenias et al., 2016, pp. 4, 28–35).

When contemplating the results from this thesis showing the households' approach to rearranging apartment space, together with other research on households' engagement in rearranging their homes, I can see that the households' spatial needs and desires, as well as their desire to engage in planning and arranging their own space, constitute a part of the households' living process and life course situation. When contemplating the contemporary practice of apartment design, however, it appears that this manipulation

of space by the households themselves is not recognized as legitimate by designers; instead they see the use of space from a top-down perspective. Residential design today generally seems to assume that relocation is the proper response to changing spatial needs (2.3.1).

In reviewing the development of current apartment design practice with the research and discussions of adaptable apartment space, however, the living process and life course situation are a salient issue. The household's expanding and contracting is a recurring question from 1940 to 1980, and suggests the relevance of enabling additional room(s) in the apartment during the time when children are growing up. Some of the early surveys made of residential practice bring up the question of how families with children growing up can address the need for dwelling space and additional rooms (Åkerman, 1941; Holm, 1955a). However, the family life course is not specifically considered a space- and time-related issue in a social context, though these surveys do address changing spatial needs during this life phase, overcrowding, and the desire to give children a room of their own (Åkerman, 1941, p. 241; Holm, 1955a, pp. 206–209).

The issue of the expanding family is also pointed out by William-Olsson in the debate that followed the competition of Experimenthuset in Järnbrott. He emphasizes the importance of the growing family's need for additional rooms, specifically the older children's need for a room of their own before they leave the home as young adults (William-Olsson, 1955, p. 293). In the survey following up Orminge (Nilsson & Åhlund, 1974), the critical value of adaptability is shown to be its capacity to provide more rooms as the household grows (2.2.3).

The issue is addressed in more recent research as well. In a report by Gaunt (1982), the household's ability to remain in place instead of moving is emphasized together with the need for adaptability to allow additional room(s) in the apartment (Gaunt, 1982, pp. 73–74). The last edition of *God bostad* (Bostadsstyrelsen, 1976) also makes an interesting contribution to this issue, presenting a large number of floor plan models with spatial qualities based on the results from current research (p. 3). One of the main ideas is the adaptability of floor plan design to facilitate the creation of additional rooms in the apartment. The issue of the expanding family is not specifically expressed, but the floor plan models show apartments that are adaptable in terms of the number and size of rooms. The household can add rooms within the same floor area, and conversely adaptability can also allow a more spacious apartment if the number of rooms is decreased.

A base standard is set where all the floor plans are adaptable with at least one possible alternative strategy supplying diverse number of rooms. Room sizes, furnishability, and room configuration are also thoroughly presented. Further, Wiktorin's report on adaptable apartments (1975) also emphasizes the issue of household expansion as a reason for adapting the apartment, and finds that, in most studies of adaptable apartments, the most common cause for adaptations is the need for greater privacy by adding a room for a child (Wiktorin, 1975, summary).

Further examples of studies addressing the issue of giving children their own rooms include a report by Lindquist (1980) and two surveys of Experimenthuset (Statens institut för byggnadsforskning, 1966; Andersson et al., 1988). The report by Lindquist (1980) is based on a large survey of residential practice, and finds that the parents seek to supply their children with a room of their own if possible, even if it means they themselves must sleep in the smallest room or in the kitchen or living room (p. 134). A similar result is found in this thesis in Study 3, Living processes, where the parents in Additionshuset supply the children with a room of their own at the expense of the convenience of having a separate bedroom for themselves (4.2.6.1, 4.2.6.2). The first survey of Experimenthuset also examines the households' need for additional rooms for the children and presents the households' expanding as being a motive for employing adaptable space, as children added to the household will in time need a room of their own (Statens institut för byggnadsforskning, 1966, p. 17).

The review presented here shows that the need for additional rooms is a recurring issue through the years, and indirectly the expanding household, living process, and family life course are part of that issue. The current design practice though, does not acknowledge the living process with the need to adapt apartment space, instead the household's mobility is expected to solve the changed spatial needs. This misconception of expected duration (SED) (Merton, 1984) means that the current dwellings lack some vital qualities concerning social sustainability dimensions.

But why is so little attention paid specifically to the issue? I can see two reasons. One is contemporary design practice's focus on mobility as a response to changing spatial needs (2.3.1); the living process over a longer time span and the idea of staying in the same apartment have not been prioritized. The other reason the need for additional rooms has been neglected, I believe, is the rational perspective on apartment design that was established during the People's Home era and in some ways still prevails today. The

rational perspective on design was characterized by standardized ideas for household types, living situations, and the apartment's spatial use together with a rationalized housing construction industry (2.1.2–2.1.4). I believe that, in this context, the issue of providing adaptable apartments to allow more spatial diversity was seen as too multifaceted and complex to fit in with the goals of affordability, standardization, and rationalization through industrial production—and so was the issue with facilitating the creation of additional rooms within the apartment. Quality housing for all could not be achieved if rational production were to give way for what was seen as not rational design. The end of direct government engagement in housing development, with subsidies gradually phased out and the transition to free-market housing (Nylander, 2013, p. 229), may also have contributed to what was seen as more rational and production-friendly designs over more multifaceted and complex designs. Even though adaptability was largely abandoned in housing design, the huge material on the subject developed through the years, both research and debate, still provide a comprehensive and dense source of knowledge on the subject.

To summarize, then, the issue of the household's living process and life course situation has been present but not observed, and the focus on rational and standardized housing with the best intentions of producing qualitative and affordable homes, have led to a top-down perspective that is not responsive to the issue. This research shows that the household's need to be able to rearrange the space of the home remains an issue. Because the issue has been neglected by design practice, households address the issue any way they can. Ignoring the household's living process as a condition for the design of apartments produces housing with less spatial capacity to respond to the household's spatial requirements, and consequently this also means that social qualities that could have been developed and attained are lost. This in turn undermines the longevity of the housing stock.

8 CONCLUDING REMARKS

This thesis concludes by explaining how adaptable space can be understood from the differing perspectives of social wellbeing and design, suggesting how to make progress in introducing the findings to become respected in design practice, and identifying further research required on the topic.

8.1 UNDERSTANDING ADAPTABLE SPACE

This thesis shows that adaptable apartment space can be understood as a time- and space-related concept that enables and supports spatial needs and social dimensions in the living situation, both for the particular household and for the surrounding community. It further shows that the household's living process and life course situation constitute preconditions for the spatial needs and the social aspects described.

This means that adaptability is contextual: the household's situation, the people involved, and the time and space establish the conditions for the need and employment of adaptability in the home. It is therefore unreasonable to expect that adaptable strategies be constantly employed. Instead, the apartment's adaptability potential can be regarded as an existing spatial quality that may be utilized at various times during the apartment's lifetime. This contextual contingency may not be recognized as a rational quality, but it contributes to the apartment's spatial capacity to accommodate different spatial needs and desires over time, and in this way adaptability contributes to increasing the social sustainability of the housing stock.

The design of adaptable apartments is a multifaceted challenge, and this thesis suggests a way to understand and process that challenge rather than prescribing how apartments should be designed. It emphasizes the preconditions for design, including the household's living process and life course situation—understanding the design of apartment space with the spatial use as related to the household's living process and life course situation over a longer time span means that social dimensions can be inscribed in the design layout. The time-space model provides a procedure for working with these qualities.

When contemplating the issue of adaptable design strategies per se it can be tempting to look for the optimal strategy in order to have the questioned “solved.” This thesis presents a number of different adaptability strategies,

from those that require little or no physical alteration of the building to some that require comprehensive renovation. I present these for the reader's own judgment, but the thesis does show that the qualities of adaptable space are as context-dependent as the social aspects found in diverse living situations (1.4). Every living situation, with the persons involved and the current space and time, establishes the conditions for what kind of adaptability strategy is required. The optimal strategy for adaptable space is therefore not one, but many, and different strategies can also complement each other. My hope is that findings in this thesis can be a seed that contributes to more adaptable design solutions, as well as encourages more comprehensive design studies on the topic.

8.2 MAKING PROGRESS TOWARD ADAPTABILITY

Because this thesis is aimed at people who work with planning, construction, and design in the housing sector, and more specifically at developers and architects, it is important to consider how adaptability can become more prevalent in the current housing design. The thesis identifies several critical issues of relevance.

The issue of a sustainable housing stock needs to be addressed among developers, planners, and architects more than it is today, recognizing the need for apartments with a more extended spatial capacity to meet the diversity of living situations and the challenges of the ongoing demographic transformation. The housing norms can prescribe the quality of adaptability just as they have previously prescribed other qualities considered as critical. The dissemination of information and knowledge also constitutes a critical issue in this context, where greater awareness of sustainability is needed. This concerns all stakeholders involved in the housing issue—architects, planners, developers, owners, and households. There needs to be a communication and an increased knowledge of the issue of adaptable apartment space and its qualities, both positive and negative, and its benefits. It is also possible for developers, architects, and planners to take the initiative to implement adaptable apartment strategies within the current norms, regardless of other stakeholders' awareness. This is being done in some current housing projects (2.2.5), one of which is the experimental Viva project. Viva provides adaptable apartment strategies that allow residents to vary the number of rooms within each apartment, touching on many of the issues explored in this thesis. When the project is completed and the residents have moved in,

there are plans to follow up this project over a number of years to come. The advantages and disadvantages of the design, the households' evaluation of the result, and the relevance of their awareness of sustainability, among other issues, can then be further researched.

8.3 FUTURE RESEARCH

I have identified in my research two salient issues that address critical factors for the subject of adaptable apartments and that call for further research. One is the issue of the household's living process and life course situation, and the social aspects and spatial needs that follow from them. This research can contribute to further developing the question of how social dimensions relate to adaptable space, adding to the knowledge in the field of apartment design. The other salient issue is how adaptable design strategies can respond to a broad context of living processes, and at the same time constitute feasible strategies when it comes to accessibility and implementation costs. This research can contribute to making social aspects a salient consideration in the design of apartment floor plans and, most importantly, help enhance the social qualities afforded to households throughout their living processes in multi-family residential buildings.

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